Action Research
for Educators

S E C O N D   E D I T I O N

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Foreword by J. Dennis Hastert

ACTION RESEARCH FOR EDUCATORS

Second Edition

Daniel R. Tomal

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FOREWORD

The principles of research provide an invaluable foundation for anyone in life. As a former government, history, and economics teacher, I know firsthand the importance of selecting curriculum and instructional techniques that are grounded in sound research-based theories and pedagogy. Without this research foundation, educators will have difficulty distinguishing between what actually contributes to effective learning and what does not.

As a former coach, I recognize the patience, diligence, respect, discipline, and effective strategies that are needed to win a sports event. Likewise, a good researcher needs these same values to be a successful educator and provide the winning edge in the classroom.

In my experience as a former United States congressman and speaker of the house, I have often relied upon the systematic process of decision making that is vital to sound research. My background in research methodology has helped me make the difficult decisions that are needed that impact our country. Empirical data are critical in discerning among the many alternatives in the decision making process.

Dr. Tomal provides an excellent basis for understanding action research that is relevant and practical for all educators. The essential research principles and strategies have been captured and well laid out

in this book. I am confident that this book will provide a positive contri-
bution to education and improve our skills as educators.

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PREFACE

Action research is one of the most practical and efficient methods of conducting research by educators. The mere mention of the word "research" should not bring terror to the minds of educators. Many educators feel that conducting research is too complicated, painstaking, and time consuming. However, action research can offer a viable approach for conducting meaningful and practical research for school improvement.

This second edition book has been written based upon years of study, research, and in-service training workshops on this topic. It has been upgraded to include additional content on qualitative and quantitative research, data-driven decision making, ethics, sampling techniques, conducting a literature review, tests of significance, statistical applications, evaluation of action research, and much more. The strategies have been applied in both public and private elementary and secondary schools and in university settings. This book includes many proven principles and ideas for teachers and administrators. *Action Research for Educators* is based on a collaborative approach of recognizing the needs of all educators in utilizing a simple but powerful method of conducting research within the educational environment.

The concepts of action research can be used to support any educational program. It is a practical and no-nonsense approach that can be used by any educator—early childhood, elementary and secondary, pre-service teacher programs, in-service teacher development programs, and at the graduate university level in educational research courses. Action research is a viable model that can be used by all educators in solving educational problems and making school improvements. Action research can also be fun and satisfying for an educator who collaborates with colleagues and students in finding solutions to problems.

The first chapter provides the principles and nature of educational research. It describes the differences in quantitative and qualitative research methods and how action research is different from these traditional methods. The chapter concludes with a definition and description of action research and how it is commonly used today in business and education.

Chapter 2 is a crucial chapter in that it provides a history of action research and a working model of this methodology. It gives the steps that an educator can use to conduct action research. The chapter also describes how to develop a formal action research proposal, conduct a literature review, employ various sampling techniques, and benchmark. The chapter concludes with basic ethical and legal considerations and guidelines when conducting research.

Chapter 3 is a detailed chapter that provides several methods of collecting data. The chapter provides an overview of several strategies for data collection, such as observing, interviewing, surveying, assessing, and processing.

Chapter 4 is important because it explains how to analyze data and make interpretations in a practical manner. It presents basic statistics in a logical and easily understandable approach, especially for people who hate statistics. The chapter also explains how to guard against threats to validity, construct meaningful graphs and diagrams using basic Microsoft Excel, use tests of significance, and write narrative reports.

The fifth chapter explains how to actually solve problems through action research. It describes several barriers to problem solving, steps in solving problems, change management, and action planning and initiating.

The sixth chapter describes how to evaluate and follow up on actions. It covers areas to evaluate, methods for evaluating results, a sample research evaluation, and a follow-up on the results of actions.

The last chapter presents actual published action research studies with a detailed commentary so that you can follow the steps to the action research model and develop a similar action research study. For those of you ready to start conducting action research, appendix F lists one hundred ideas for conducting action research studies. The practical and viable ideas could be used by any educator to conduct action research and make educational improvements.

FEATURES OF THE BOOK

Many books written on educational research can be dry, esoteric, and impractical for educators. This book is unique because it presents clearly defined examples and content that is practical and user-friendly for all educators. The most intriguing and unique feature of this book, unlike other books written on research, is the introduction of well-defined procedures in conducting action research for both teachers and administrators. Also, understanding the use of several techniques can allow educators to rapidly employ these techniques in their own educational environment. The use of action research can help teachers improve discipline, motivate students, and increase student learning, student self-esteem, and quality of school life in their classrooms. For the school administrator, action research can help improve attendance, discipline, teacher morale and performance, communications, parent and community relations, student performance, and the organizational environment.

Another valuable feature is the numerous examples of methods of using action research in the school environment. Real-life situations are presented that contain actual vignettes with practical solutions that any educator can utilize in improving education. This unique feature has been appreciated by teachers during in-service teacher training in giving specific examples of where education research can be used in the classroom. These examples can help to stimulate the thinking of teachers

and administrators so that they can make improvements within their own classroom and school.

Several other updated features of this book include:

- A procedure for using action research in the school environment
- A model of action research with examples
- A comprehensive description of how action research varies from the use of qualitative and quantitative research methodology
- Examples of benchmarking techniques that can aid an educator in using action research
- Information on evaluating action research studies
- A more detailed description of quantitative and qualitative research methods
- Data-driven decision making strategies
- Examples on how to conduct literature reviews
- A detailed explanation of collecting data and analyzing this data in a practical manner
- Practical tips and strategies to analyze data using basic statistical methods
- Samples of teacher action research projects and references
- How to construct graphs using Microsoft Excel
- Methods of evaluating action research
- Explanation of how to conduct a formal action research proposal
- Strategies in conducting interviews and surveys
- Examples of tests of significance

The technique of action research, as presented in this book, has been applied in schools and taught for several years. For example, this technique has been used in major school districts to improve performance on test scores, teacher morale, quality of student learning, leadership discipline, and safety. The principles of action research have also been implemented as a process to diagnose school organizational problems and to develop specific action plans to help improve the overall performance of schools, colleges, and universities. Several schools have implemented the principles from this book. Professionals have used this research to study student discipline problems and absenteeism, student

motivation and self-esteem, teacher morale and stress, and overall student performance in the classroom.

This book contains a rich source of educational and reference aids so that educators can apply the principles of action research. Some of these aids include:

- A checklist for evaluating action research studies
- A sample of educational problems
- A sample of field-based education issues
- Detailed listing of references and benchmarking techniques
- Samples of teacher action research projects
- Examples of using action research to improve the overall school management
- Case illustrations and figures in understanding action research
- One hundred ideas for conducting action research
- Actual examples of surveys and questionnaires used in action research
- Twenty-five additional ideas for action research studies
- Exercises and discussion questions at the end of each chapter

If you desire a supplemental book that supports this book, consider *The Toolkit for Researchers* by Sandy Alber (Rowman & Littlefield Education).

ORGANIZATION OF THE BOOK

This book has been written for an educator to understand the basics of action research and to apply action research in solving school problems and making improvements. Each chapter builds upon the other. Given that much of the material in this book has been developed and refined throughout the years through teaching the subject at the graduate level and in educator in-service workshops, the information is practical and straightforward.

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The author acknowledges the many people who have contributed by providing support and input for the preparation of this book. Special appreciation is given to the author's students, colleagues, former business associates, and to Susan Webb for typing the manuscript. Appreciation is especially extended to the many school districts where the author has worked or given seminars, such as Chicago Public Schools, Bellwood School District 88, Cicero School District 99, Lake Central School Corporation, Proviso Township High Schools, West Chicago District 33, Michigan City Township High Schools, Findlay Schools, Concordia University–Chicago, and Lutheran Church Missouri Synod Schools. Last, the author would like to extend his gratitude to his family: his wife, Annette; and children, Jonathan, Stephanie, and Justin.

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THE NATURE OF EDUCATION RESEARCH

PRINCIPLES OF RESEARCH

A working definition of research is the systematic process of attempting to find a solution to a problem (when the solution is not known) using an acceptable methodology. The argument can be made that if the solution to the problem is known, then a person merely needs to find the solution, and, therefore, systematic research is not necessary. Research involves more than just finding a known solution to a problem. It entails a careful undertaking to discover new facts and relationships concerning a solution that is unknown.

Many people use the term *research* loosely when, in fact, the process of research is much more investigative and scientific. As early as the 1930s, the famous philosopher John Dewey (1933) outlined the scientific process of research consisting of: problem identification, developing a hypothesis (or educated guess), collecting and analyzing data, and drawing conclusions concerning the data and hypothesis (see fig. 1.1).

The basis of Dewey's description of scientific research is somewhat similar to the process used today. Although variations in the process exist, depending upon the research methodology, this process is generally accepted as a general framework for scientific inquiry. Several common terms are used in research. The term *theory* can be described as "an

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Problem identification

Figure 1.1. John Dewey's Scientific Process of Research	➥ Clarification of main question ➥ Description of hypothesis ➥ Collection and analysis of data ➥ Drawing conclusions ➥ Rejecting or accepting hypothesis

explanation of observed phenomena." For example, most educators have learned Abraham Maslow's sociological human needs theory. Maslow (1943) attempted to describe the sociological needs of human beings through a hierarchy of lower-level and higher-level human needs. In essence, his explanation is called a *research thesis*. Piaget's theory of human development is another example of a theory (1926). Many of Piaget's theories are familiar to educators who attempt to understand the development of children. Theories are an important part of research because the result of research often concludes with the development of a theory.

The term *construct* is a concept that we cannot observe specifically. Constructs are concepts such as intelligence, self-esteem, morality, personality, and satisfaction. These terms need to be quantified so they can be measured and explained through assigning values, definitions, and types. For example, intelligence can be "operationalized" by creating an assessment and measurement values (e.g., 100 IQ).

Another term that is used in research is called the *variable*. A variable is a quantitative way to describe a concept. Typically, the two kinds of variables are *independent variables* and *dependent variables*. Independent variables are defined as the cause of some action, and dependent variables refer to the effect of some action. For example, if we were to reconstruct an experimental research study based on the question of whether fluoride reduces tooth decay, we might have two variables. The first variable, fluoride toothpaste, would be the independent variable (i.e., the effect of the fluoride on tooth decay), and the second variable, the dependent variable, could be the difference in the tooth decay (i.e., the reduction of tooth decay). Variables are often used in research to help describe a cause-and-effect relationship.

One of the more popular terms used in research is the *hypothesis*. A hypothesis can be described as simply an "educated guess." A more scientific definition of a hypothesis might be "the description of the

relationship among two variables." Researchers often use two types of hypotheses: the *null hypothesis* and the *directional hypothesis*. The null hypothesis states that there is no difference or relationship between two variables. For example, a null hypothesis might state that, "there will be no significant difference in tooth decay between the people using fluoride toothpaste versus people who use non-fluoride toothpaste." Another example is "there is no significant difference in student math performance between students receiving computer-assisted instruction versus students receiving traditional math instruction." An example of a directional hypothesis is when the researcher makes a guess that there will be a difference in two variables, such as, "the use of fluoride toothpaste will reduce tooth decay." Although both null and directional hypotheses are used in research, the null hypothesis is probably more popular because it tends to prevent the researcher from having a bias.

QUANTITATIVE VERSUS QUALITATIVE RESEARCH

Given that research is the scientific approach to solve a problem when the answer is not known, a researcher can undertake different approaches in this endeavor. The process of seeking truth is defined as *epistemology*. This philosophy of science describes how researchers acquire knowledge. Basically, the two methods of epistemology are called *quantitative* and *qualitative*. Quantitative research is a very objective type of scientific inquiry in which the researcher attempts to be detached from the actual subjects of the study. Quantitative researchers are characteristic of the classical medical scientists who study and independently make observations about the cause and effect of variables. Qualitative researchers, on the other hand, are much more personally involved with their study. Qualitative research is more naturalistic, emergent, and case oriented. A typical qualitative researcher might be a person who actually goes into the natural setting and makes observations. For example, if a researcher is studying the behavior of monkeys, the qualitative researcher might go into the natural environment of monkeys, become part of their everyday life and make narrative observations. Figure 1.2 shows a description of these two types of epistemology research methods.

Quantitative

▶ Uses numerical data to describe phenomena
▶ Assumes objective reality
▶ Constructs a hypothesis and uses variables
▶ Studies behavior in natural or contrived settings
▶ Uses statistical analysis to analyze data and make conclusions
▶ Accepts or rejects a hypothesis

Qualitative

▶ Studies the natural setting of the subject
▶ Assumes researcher is involved in the study to some extent
▶ Assumes each study is independent to itself and emergent
▶ Studies theories and concepts that often derived during the research
▶ A hypothesis is not always made, but may include a tentative hypothesis
▶ Makes narrative descriptions in making conclusions

Figure 1.2.   Characteristics of Quantitative and Qualitative Research

Different methods of research can be categorized as being more quantitative than qualitative (see fig. 1.3). Four popular types of quantitative research are: *experimental*, *casual comparative*, *correlational*, and *descriptive*. Experimental research is concerned with the cause and effect of variables and provides one of the most rigorous approaches to showing causation. True experimental research is very scientific in its design, and researchers highly value its results, especially when showing a cause-and-effect relationship. Experimental research starts with formation of a hypothesis. Typically in education research, a null hypothesis is used. The objective is not to prove causation but to attempt to accept or reject the null hypothesis. The beginning researcher often makes the mistake of using the terminology of "proving a relationship between two variables." It is very difficult, if not impossible, to prove cause and effect by simply conducting one experimental research study. Once the researcher establishes a hypothesis (Ho: $A = B$), then the researcher conducts the study and generally tests the hypothesis using an appropriate *test of significance*. There are basically two categories of tests of significance: (1) *parametric* (typically used for ordinal and nominal data) and (2) *non-parametric* (typically used for interval and ratio data). Parametric data make assumptions that the data typically have a normal distribution, such as student test scores, and non-parametric data don't

Quantitative

▶ Experimental
▶ Causal Comparative
▶ Correlational
▶ Descriptive or Survey

Qualitative

▶ Historical
▶ Ethnography
▶ Phenomenology and Cultural
▶ Case Studies

Figure 1.3.   Types of Quantitative and Qualitative Research

meet the requirements of parametric data and often involve independent samples and probability, such as analyzing the response scores on a survey scale from one to five. It is important that the researcher consults a statistician to select the appropriate test of significance (see chapter 4 for additional information on tests of significance).

Once the data are tested through the test of significance, the researcher then concludes whether to accept or reject the hypothesis. When the hypothesis is rejected statistically, it is always done at a probability level (p value). The probability value is often called a significance level or alpha level. The typical significance level is often set at .05 and .01. If the hypothesis is rejected using a significance level .05, then the researcher concludes that there is a 95 percent chance that there is a real significant difference and that the difference is not explained by mere chance or poor sampling. A significance level .01 would indicate there is a 99 percent chance of a true difference. Therefore, if the null hypothesis is rejected, then there is significance. If the null hypothesis is not rejected, then the hypothesis is accepted, and there is no significant difference. An easy way to remember this principle is the phrase "if the p is low, the null must go." Typically any time the p value is less than or equal to .05, then the null hypothesis is rejected and significance is found.

When conducting experimental research, the most popular research design is called a pretest-posttest control group design (see fig. 1.4). In this design, the researcher random samples subjects from a defined population. The first group is the experimental group, and the second group is the control group. Both groups are given a pretest. Then group one is given the intervention (independent variable or special instruction), and the control group is given a placebo. The placebo, in medical terms, is a sham intervention and generally consists of a sugar pill. In educational research, the placebo might consist of the traditional instruction. After the experiment, both groups are then given a posttest. The posttest is often referred to as the dependent variable. While there are other experimental designs (one-shot case study, one-group pretest-posttest design, time series), the pretest-posttest control group is the most popular design and controls for threats to validity (explained in chapter 4).

The purpose of correlational research is to determine the relationship of variables, which can also be used for prediction. Typically, the

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Group 1:  R  O  X  O
Group 2:  R  O     O
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Figure 1.4. Pretest-Posttest Control Group Design

R = Random Sampling
O = Pretest or Post test
X = Intervention

Group 1 = Experimental Group
Group 2 = Control Group

purpose of correlational research is to discover relationships between variables. Understanding correlations (correlation-coefficient) is best done through use of a scattergram (see fig. 1.5).

The correlation research design is concerned about the relationships between two variables or if these two variables are correlated. The answer to this question is performed by a statistical technique called correlation. Two variables either have a positive correlation, a negative correlation, or an absence of a correlation. The X axis describes the horizontal line and the Y axis the vertical line. The correlation expression is typically represented by the symbol r. A perfect positive correlation would be expressed $r = +1.00$. A perfect negative correlation is $r = -1.00$, and no correlation would be $r = 0$.

An example of a correlation can be described as the comparison of elementary students' height and weight. Typically as students grow taller, they will weigh more, and this relationship is expressed as a possible correlation. An example of a negative correlation could be height and age after 65 years. As a person ages beyond 65 years, his or her height typically reduces (a negative relationship). It is important to note that correlations are very useful in education, although they do not necessarily prove causation. Historically, researchers have seen a positive relationship between cigarette smoking and lung disease. However, this mere correlation did not actually prove that cigarette smoking caused lung disease and, therefore, additional scientific studies needed to be performed to establish this causation. Correlations can also be useful in predicting such things as student success in college and the potential effectiveness of instructional methods. There are different types of correlational coefficient tests. The type of test used depends upon the type of data. For example, a Pearson product-moment is often used for continuous data; Spearman's rho could be used for rank data; and a phi
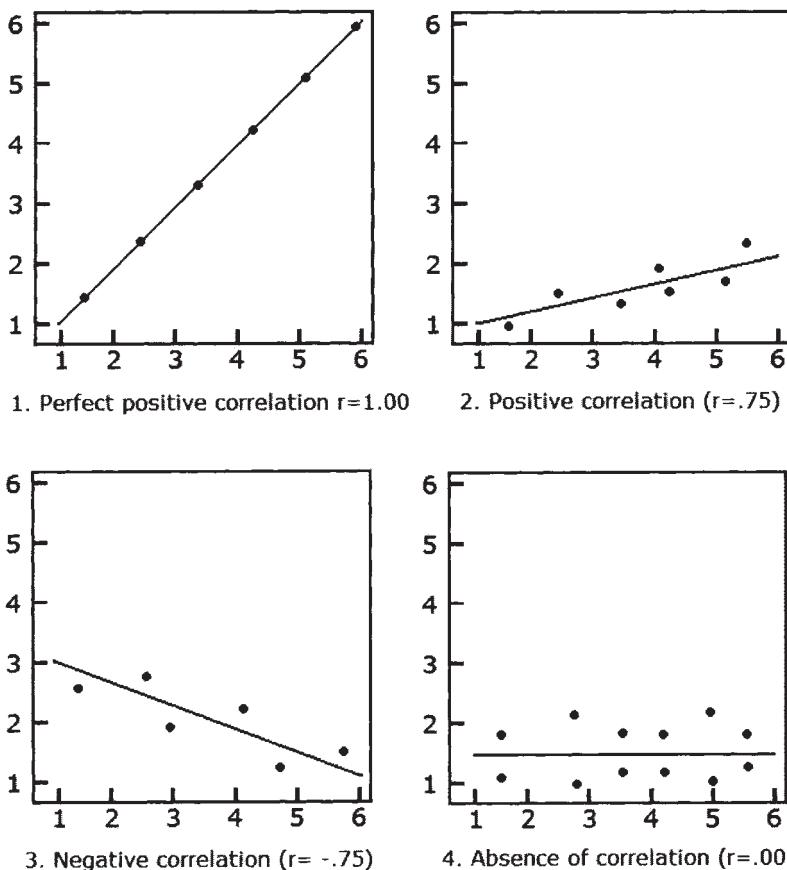
Figure 1.5. Scattergram Showing Different Relationships Between Two Variables

coefficient could be used for a dichotomy. Also, a combination of variables, or several variables, can be used with a criterion variable (called a multiple regression).

Causal comparative research is very similar to experimental research, but it is research that is conducted after the data have been collected (ex post facto). An example would be the study of the cause and effect of cigarette smoking and cancer after people have died. In this type of retrospective research, independent and dependent variables are used. However, there is a lack of randomization, and the groups have already been formed. A hypothesis is generally constructed, and the experiment is conducted without manipulation of the independent variable, given that the action has already occurred. In this type of study, the researcher

is primarily collecting and analyzing data and performing statistical analysis. An example of this type of research in education would be when an educator uses a different type of instructional approach and discovers a gain in student learning. The educator could then conduct a causal comparative study to better understand the cause of the improvement or reason for the differences between the two groups. While causal comparative research seeks to determine difference in relationships, only experimental research can actually establish cause-and-effect relationships.

Descriptive (survey) research attempts to describe the present status of phenomena, such as administering a survey to acquire people's feelings about the school environment. Descriptive research typically involves administering questionnaires or conducting interviews with people. The questionnaire is often used when there are a large number of respondents or anonymity is desired. Some guidelines in designing the survey questionnaire are found in figure 1.6. Surveys are used extensively in educational research. Examples include assessing the opinions of teachers, input from parents, and student assessments. Some disadvantages to surveys include: the researcher cannot ask follow-up and probing questions to the respondents, scoring narrative responses can be time consuming, and respondents may not answer the questions completely or take the time to answer them accurately or honestly. The questionnaire generally contains two types of questions: closed-ended questions or open-ended questions. Additional information on descriptive research (surveys) is found in chapter 3.

1. Use concise language
2. Avoid jargon or complex terms
3. Include easy-to-use check boxes or blank lines
4. Number the pages and items
5. Organize items in listed order
6. Explain purpose of survey
7. Avoid negative language or tone
8. Avoid terms like *always* and *never*
9. Avoid leading questions
10. Include name and address of researcher

Figure 1.6.   Guidelines for Designing Survey Questionnaires

Qualitative research is used extensively in the educational environment. This research is grounded in the assumption that observations of phenomena are interpreted by the researcher. Qualitative research is often conducted prior to quantitative research. For example, qualitative research might be conducted to make inquiries and discover phenomena in order to provide a foundation for more scientific research. While both quantitative and qualitative research are useful, they can be used to complement each other, especially when used in mixed methodology research (a combination of both). However, some researchers believe that the fundamental epistemological foundations of these two research types are incompatible given the wide differences in their approach.

Qualitative research can be very helpful in studying localized occurrences in the classroom and exploring reasons for learning (real-world settings). Therefore, this research is naturalistic, inductive, holistic, personal, unique, and dynamic. However, total objectivity is nearly impossible, and there is always some degree of subjectivity and researcher involvement (called reflexivity).

Four popular types of qualitative research are: *historical*, *ethnography*, *phenomenological* and *cultural*, and *case study* (see fig. 1.3). Historical research is concerned with answering questions regarding the past, such as conducting an autobiography. Ethnography generally describes people within social environments. Phenomenological and cultural research tends to study various phenomena and cultures of people within an environment. Case studies generally are used to study deviant groups or information-rich subjects, such as gifted students, in their natural setting.

Figure 1.7 provides examples for collecting data in qualitative research. Each of the types of qualitative research has a distinct purpose and approach. For example, historical research is commonly conducted by examining past records and documents in order to make conclusions about past events and people. This research might also include talking to people who witnessed accounts and events and examining written and visual materials, such as maps, electronic data, video tapes, biographies, personal journals or diaries, and books. Ethnography tends to be concerned about the behaviors of individuals within a culture or social group. Data method collections often involve personal observations, structured and unstructured interviews, and examination of documents. Phenomenological studies involve the examination of how people

Figure 1.7. Examples of Collecting Qualitative Data

▶ Observing student behavior
▶ Observing students work in the classroom
▶ Conducting open-ended interview
▶ Conducting a focus group
▶ Examining biographies
▶ Reviewing autobiographies
▶ Reviewing personal journals
▶ Examining school documents
▶ Examining photographs and videos

conceptualize their environment and world in which they live. These perceptions often have a psychological base and often involve the use of observation and structured and unstructured interviews with individuals. The case study research method is a very popular qualitative design. The purpose of the case study is to further understand a person's behavior and perception of his or her environment and situation. Case study research often involves understanding the perceptions of people regarding the phenomena involved. Typical methods of data collection involve structured and unstructured interviews, observations, and examination of written and visual documents. One other distinctive type of research is called *meta-analysis*. This is a special research technique whereby the researcher summarizes the findings of numerous published studies on the same topic and draws numerical conclusions on the results. Meta-analysis requires a disciplined and systematic approach to examining the compilation of studies and translating the results into a numerical value called an "effect size." The effect size is similar to a coefficient—the higher the effect size (e.g., 80), the stronger the effectiveness. Likewise, the lower the effect size (e.g., 30), the weaker the effectiveness. For example, if the research topic is the use of positive reinforcement and student achievement, we would probably expect to see a very high effect size given that most studies have shown a high relationship between these two variables.

ACTION RESEARCH PRINCIPLES

Simply stated, action research is a systematic process of solving educational problems and making improvements. Action research is different

Quantitative
➡ A scientific approach to undertaking research

Qualitative
➡ A naturalistic and emergent approach to enquiry

Action Research
➡ A process of solving problems and making improvements

Figure 1.8. Three Approaches to Research

from quantitative and qualitative research but has characteristics of both. An action researcher utilizes an appropriate intervention to collect and analyze data and to implement actions to address educational issues. Action research is suitable for educators as a practical process because it does not require elaborate statistical analysis (e.g., quantitative research) or lengthy narrative explanations (e.g., qualitative research) but is more concerned with solving a problem in an efficient and feasible manner (see fig. 1.8). Also, while traditional research methods are much more concerned with relating the findings to other settings or populations, action research is more concerned with improvements within the context of the study (i.e., solving a given problem). Figure 1.8 describes these three approaches to research (Tomal, 1996).

CHAPTER 1 EXERCISES AND DISCUSSION QUESTIONS

1. Describe the characteristics of quantitative and qualitative research.
2. Explain how to conduct experimental research.
3. Explain the typical designs of a correlated scattergram.
4. List and describe examples of both quantitative and qualitative designs.
5. List and describe John Dewey's scientific process of research.
6. List the guidelines for designing survey questionnaires.
7. List examples of collecting qualitative research data.
8. Explain the different types of hypotheses.
9. Explain the purpose of casual comparative research.
10. What is a test of significance?

2

ACTION RESEARCH

HISTORY OF ACTION RESEARCH

Although traces of action research theory can be found in the writings of such philosophers as Aristotle, Galileo, and Newton, one of the earliest philosophers to contribute a foundation for action research in education was John Dewey (1933). Dewey, an American, developed a progressive and scientific method of problem solving. Dewey's practical model of scientific inquiry, previously presented in chapter 1 (see fig. 1.1), was viewed as being revolutionary during his time. Dewey viewed the classroom as a democratic community and felt that educators should be skeptical of teaching and should be concerned with reflection and improvement. Dewey's steps to educational research are similar to quantitative research methodology, although he emphasized more practicality than basic scientific research.

Many researchers have credited the actual cornerstone of action research to Kurt Lewin (French & Bell, 1995; Tomal, 1997; and Lippitt, Watson, & Westley, 1958). Lewin, a prolific theorist and practitioner, founded the Research Center for Group Dynamics at the Massachusetts Institute of Technology, where group dynamics and action research models and theories were developed. Lewin applied action research strategies as a methodology in behavioral science in attempting to solve

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sociological problems. He felt that action research programs were crucial in addressing social change issues and making social improvements. Lewin emphasized the need for collaboration and group inquiry in collecting information about social issues and developing action plans to solve these social problems (Lewin, 1947). Lewin's methods did not gain widespread popularity in the business and educational fields until the 1970s, when management consultants began using the principles of action research to improve organizational effectiveness. Although the use of action research flourished in the business world during the 1980s, it has only been within the last couple of decades that action research has been widely used and formally applied in the educational environment (French & Bell, 1995; Sagor, 1992).

In action research, the researcher is concerned with using a systematic process in solving educational problems and making improvements. The researcher utilizes appropriate interventions to collect and analyze data and then to implement actions to address educational issues. Action research is suitable for educators as a practical process because it generally does not require elaborate statistical analysis. Also, although traditional research methods are very concerned with generalizability (i.e., applicability of the findings to other settings or populations), action research is more concerned with improvement within the context of the study. Richard Sagor (1992), in his book *How to Conduct Collaborative Action Research*, emphasizes this point by stating: "As action researchers, you don't need to worry about the generalizability of your data because you are not seeking to define the ultimate truth of learning theory. Your goal is to understand what is happening in your school or classroom and to determine what might improve things in that context" (Sagor, p. 8).

Several features of action research distinguish it from other research methods. In traditional research, the researcher usually develops a null hypothesis as an objective basis to undertake a study. The researcher then sets out to either accept or reject this hypothesis. Scientific conclusions are later drawn. Action research does not entail creating a null hypothesis but rather focuses on defining a problem, collecting data, and taking action to solve the problem. Also, the action researcher is less concerned with statistical analysis as compared to the quantitative researcher. Therefore, action research is often called practitioner or

school-based research since it is often teacher initiated. This type of re-search is most suitable for teachers since they generally do not conduct quantitative or qualitative research but desire to make practical educa-tion improvements.

Action research is also different from qualitative research. Qualitative researchers are generally concerned about discovering information about data-rich cases found in natural settings and then making inductive con-clusions. Action research is much more direct in its purpose. Since the goal is to solve a given problem and make improvements, action research-ers rely less on scientific inquiry and inductive reasoning and more on reflection and the practicality and feasibility of addressing a problem.

Another feature of action research is the collaborative nature of the work. Generally, action research is conducted by a change agent (i.e., con-sultant, researcher, educator, or administrator) who works with identified subjects within the context of a group (classroom, school, or organization) in conducting the study. The change agent acts as a catalyst in collecting data and then working with the group in a collaborative effort to develop actions to address the issues. Action research is often considered a process as much as a research methodology. This process is concerned with the systematic collecting of data, which is analyzed and fed back to the sub-jects so that action plans can be systematically developed. Therefore, ac-tion research is distinguished from other research methodologies because of the collaborative effort of the researcher in working with the subjects and developing action plans to make improvements (Tomal, 1996).

Before educators began using action research methodology on a wide-spread basis, action research was utilized within the business world by organization development consultants. Organizational consultants (OD practitioners) have used action research principles to make operational and performance improvements within organizations (French & Bell, 1995). OD practitioners have been generally concerned with improving employee morale, productivity, profitability, teamwork, communication, and quality of work life.

A final distinguishing feature of action research is the researcher's use of various interventions (i.e., set of structured activities), which provide the mechanism for the research action. These interventions include such techniques as team building, survey feedback, problem-solving strategies, intergroup activities, diagnostic assessments, interviews, role

negotiations, conflict resolutions, third-party peacemaking, visioning, socio-technical systems, statistical process controls, strategic planning, and a host of other creative schemes. Understanding just a few of these interventions can allow an educator to undertake worthwhile research. Figure 2.1 illustrates some of the typical interventions used by OD consultants for various organizational problems.

Much like the OD practitioner, administrators can utilize the same interventions in addressing a multitude of educational issues. Likewise, action research is useful for teachers as a practical and sensible methodology for making classroom improvements.

Problem/Issue: Organizational inefficiency and poor leadership
➥ *Intervention*
Survey feedback
Total quality management
Visioning
Cultural study
Socio-technical system
Leadership grid

Problem/Issue: Poor morale and teamwork
➥ *Intervention*
Team building
Conflict resolution
Quality of work life

Problem/Issue: Group and organizational conflict
➥ *Intervention*
Peacemaking
Conflict resolution
Team building
Role negotiating
Sensitivity training

Problem/Issue: Career and performance difficulties
➥ *Intervention*
Team building
Coaching
Education

Figure 2.1. Organizational Issues and Possible Intervention Method

ACTION RESEARCH MODEL

Kurt Lewin was an initial pioneer in establishing the action research model, but many researchers have proposed variations of his model (Beckhard, 1969; Argyris, 1970; Shepard, 1960; French & Bell, 1995). Although variations in this model exist, depending upon the nature of the researcher's discipline, the general framework is similar to Lewin's original model. For example, a general model of action research derived from the work of Kurt Lewin is illustrated in figure 2.2. The use of this model would be essentially the same whether an administrator desires to improve staff morale, a teacher seeks to improve classroom discipline, or a dean desires to improve student attendance.

Stage 1: Problem Statement
(Initial Diagnosis)

↓

Stage 2: Data Collection

↓

Stage 3: Analysis and Feedback

↓

Stage 4: Action Planning

↓

Stage 5: Taking Action
(Implementation)

↓

Stage 6: Evaluation and Follow-up
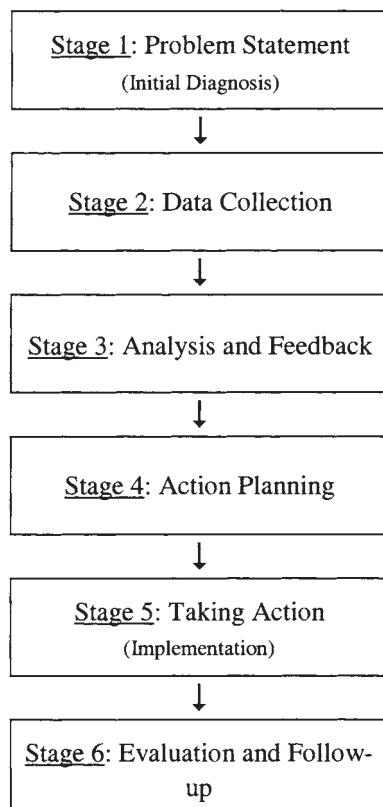
Figure 2.2.   Action Research Model

The process of action research is very similar to the approach used by a physician in treating a patient. The doctor first makes an initial problem statement based upon the patient's complaint (e.g., patient's back hurts), conducts a series of medical diagnostic tests (data collection), discusses the results of these tests with the patient (analysis and feedback), makes a decision and treats the patient (planning and taking action), and then follows up on the patient's condition (evaluation and follow-up).

Let's explore an example of applying this action research model for an educational issue, such as staff development. We will start with the assumption that the school principal does not know which of the teacher developmental areas are in need of improvement. Also, we will assume that the principal would like the teachers to develop a feeling of ownership (i.e., "buy in") in the process, rather than feeling as if the proposed developmental effect is being mandated. Figure 2.3 lists typical examples of professional development needs.

Student-Centered Issues

- Building self-esteem
- Improving study habits
- Improving student character
- Developing student interpersonal relationships
- Helping students work together
- Helping students deal with change
- Improving student motivation

School-Centered Issues

- Dealing with financial constraints
- Gaining more parent involvement
- Improving the organizational structure
- Improving leadership
- Developing better teamwork
- Developing school improvement plan

Teacher-Classroom Issues

- Improving student attendance
- Managing student conflict
- Counseling students
- Helping students manage strong emotions
- Teaching challenging students
- Handling disciplinary problems
- Handling student complaints

Instructional-Development Issues

- Improving test scores
- Improving instructional techniques
- Developing team teaching
- Enhancing instruction
- Improving curriculum
- Improving student achievement

Figure 2.3. Examples of Professional Development Needs

Stage 1: Problem Statement (Initial Diagnosis)

The process begins with the principal's identifying the initial problem based upon a "felt need" that her faculty would benefit from continuing professional development. Her initial diagnosis suggests a need for teacher skill development based upon requests from the faculty, reading research articles, and the observation of teacher and student performance. The principal might explore different methods to collect data (e.g., survey, needs assessment) for determining skill deficiencies or areas in need of improvement for the faculty. She would also conduct preliminary costs, time estimates, possible facilitators, tentative workshop dates, and other logistics prior to initiating and announcing her intentions. It is important during this initial diagnosis stage that the principal conduct a reasonable amount of planning in order to decide whether to undertake the action research project.

Stage 2: Data Collection

Data collection, the second stage, can be accomplished by several methods, such as needs assessment, interviews, and group meetings. For example, if the principal elects to administer a needs assessment, this approach can be useful in ensuring confidentiality and anonymity. A typical needs assessment might consist of a list of professional development topics (e.g., class management, learning styles, curriculum development, stress management, counseling students, and instructional techniques) where the respondents are asked to assign a value to each topic (i.e., Likert grading scale) indicating the degree of need for further development.

Random one-on-one, follow-up interviews with teachers could also be conducted to gain clarification about the topics identified in the needs assessment period. This information could be helpful in gaining additional information concerning additional organizational issues and isolating specific development needs for the teachers.

Stage 3: Analysis and Feedback

In this stage, the results of the survey could be made by calculating simple mean averages, then ranking the professional development topics

in order of importance. The principal could then conduct a feedback session with the faculty to review the rankings, gain clarification about the results, and obtain input from them regarding the desired topics. Although preliminary action planning might occur in this feedback session, the primary objective is to gain clarification about the collected data. Also, as a practical matter, various organizational issues (e.g., time constraints, teacher schedules, and need for further analysis) could hinder the principal from making final actions or commitments without conducting the feedback session.

The feedback session is a crucial stage in an action research process that provides an element of collaboration. This stage also helps develop communications, trust, and mutual support between the principal and faculty. The first three stages of the action research model (problem statement, data collection, and analysis and feedback) can be described as the problem-solving segment of the action research process. These stages serve to identify the cause(s) of the problem and specific areas in need of improvement. While feedback is important, it may not always be possible, depending upon the issue. Also, reflection may play a significant role in this stage. The reflection used is often post hoc since it occurs after data collection. Reflection involves deep concentration about the problem being studied and the data. Reflection is limited to accurate recall and data. For this reason, participant feedback is helpful to validate impressions and gain collaboration.

Stage 4: Action Planning

Stage 4, action planning, is the decision-making segment of the process. It involves deciding upon a course of action to address the issue(s). This process can be accomplished through a number of methods. The principal may make in-service training plans (i.e., final selection of topics, scheduling and program logistics). A faculty involvement team, consisting of selected teachers, could also be assembled to develop and implement the action plans. Prior to implementing the actions, the final plan could also be reviewed by the entire faculty. Action planning also generally requires determining resources needed (money, time, people, facilities, equipment, learning materials) for proposed action(s).

Stage 5: Taking Action

In stage 5, the action plan would be implemented (i.e., in-service program). To reinforce a collaborative process, the principal might want to actually participate in the in-service program. This implementation stage represents the actual action part of the action research process. At the conclusion of the workshop, an evaluation could also be conducted.

Stage 6: Evaluation and Follow-up

A formal assessment should be conducted in the final stage (evaluation and follow-up). This stage entails following up and assessing the results of the action. Action research, unlike other methods, includes implementation and evaluation as part of the process. For example, the principal might administer a workshop evaluation, conduct follow-up surveys, or measure actual benefits from in-service programs through student achievements, performance observations, and so forth. This stage could also act as a vehicle for continuous improvement for the organization.

Let's explore another example of applying the action research model, such as improving classroom discipline. We'll start with the assumption that a teacher is experiencing a high number of student disruptions and disciplinary incidents in her classroom.

Stage 1: Problem Statement (Initial Diagnosis)

The teacher recognizes that she is experiencing a high number of disciplinary problems and would like to make improvements. In this first step, she would start with an initial analysis of the disciplinary situation. The teacher examines the overall dynamics of the classroom, such as the types of disciplinary offenses, when the offenses are being committed, and who is primarily committing the offenses, and the teacher investigates the current disciplinary policies and procedures. This step can be called *situational analysis*. An analogy can be made to a medical doctor who first examines the patient and completes a history and physical report. The doctor records the patient's symptoms, past and

present health problems, and medications being taken. Likewise, the teacher should collect all the relevant information in order to make an accurate diagnosis.

Stage 2: Data Collection

In the second stage, the teacher begins by investigating the facts (i.e., data collection) surrounding the disciplinary problems. The teacher should examine the "who, what, where, and when." The teacher should note any deviations from what has normally been experienced in the past. For example, the teacher might identify increased incidents of verbal fighting and harassment among students than experienced before. The teacher should also identify the "what is" versus "what is not." For example, the "what is" could be identified as dominantly younger students (freshman and sophomores) who are harassing each other versus junior and senior students (the "what is not"). In this manner, the teacher is able to dissect the problem by pinpointing the exact facts to the disciplinary situation.

Stage 3: Analysis and Feedback

After the teacher collects information regarding the types and nature of disciplinary offenses, she is ready for the analysis stage. In this stage, she should actually complete a problem-solving phase of this process by identifying the most likely causes for disciplinary problems. If there is more than one cause, she could rank them in order of importance. The teacher might also want to discuss the nature of the disciplinary offences with her students. By discussing the disciplinary problems with the students, she might gain more insight regarding other causes of the problem.

Stage 4: Action Planning

The action planning stage is similar to a decision-making process. After the teacher identifies the types of disciplinary problems, she should begin listing various solutions to resolve the disciplinary issues. Some solutions might consist of: separating problem students from one another,

making curriculum or instruction changes, and changing the classroom rules and policies. The action planning phase concludes with identifying the most likely solution(s) for resolving the disciplinary incidents. This stage might also include analysis of each action. The merits of each action should be examined for their strengths and weaknesses in resolving disciplinary problems. For example, if the disciplinary problem tends to be an increase in student assaults, the teacher could work with a committee to examine possible solutions, such as educating students about assaults, making improvements within the classroom environment, removing a problem student from the classroom, or building the self-esteem of students.

Stage 5: Taking Action

Although this stage entails that the teacher actually incorporate the action(s), the teacher might also want to develop a contingency plan. A contingency plan involves developing an alternative course of action should the initial action prove unsuccessful. For example, if the problem is student assaults, the contingency plan might include harsher penalties for offenders, more elaborate classroom changes, or increased security.

Stage 6: Evaluation and Follow-up

The final stage involves evaluating the results of the action(s). After implementing the solution, the teacher needs to evaluate the results. Once an evaluation has been made, continuous improvement processes could also be incorporated.

DEVELOPING AN ACTION RESEARCH PROPOSAL

The development of a formal action research study (e.g., thesis, dissertation, funded study, and comprehensive school study) requires careful planning and execution. Before undertaking a formal study, a research proposal should first be developed. The proposal serves as a plan in guiding the educator through the research process. There are five basic steps in preparing the proposal (see fig. 2.4).

```
┌────────────────────────────┐
│ Stage 1: Identify the research │
│           topic            │
└────────────────────────────┘
              ↓
┌────────────────────────────┐
│ Stage 2: Write the statement of │
│        the problem         │
└────────────────────────────┘
              ↓
┌────────────────────────────┐
│ Stage 3: Develop a researchable │
│          question          │
└────────────────────────────┘
              ↓
┌────────────────────────────┐
│ Stage 4: Review the literature │
│  and conduct benchmarking  │
└────────────────────────────┘
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┌────────────────────────────┐
│ Stage 5: Describe the action │
│      research design       │
└────────────────────────────┘
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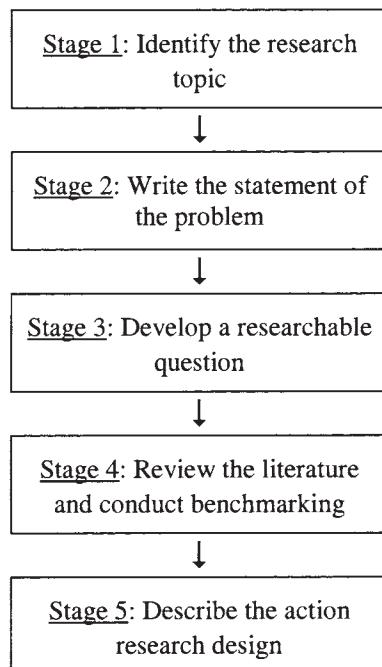
Figure 2.4. Developing an Action Research Proposal

The process begins by identifying the topic, such as student motivation. Step two involves writing the statement of the problem. For example, an educator might first begin with an issue, such as "students are not reading at home during their leisure time." The teacher then begins to formulate an action research question (step three), such as "I wonder if there are things I can do to help motivate the students to read during their leisure time?" or "I wonder if extrinsic rewards, such as gift certificates or prizes, would help motivate students to read?" The fourth step in preparing the research proposal entails reviewing the literature. In this stage, the teacher could read several articles from journals, magazines, books, and other resource materials and identify possible methods to provide incentives for students. The final step of the preparation plan involves the teacher's thinking about how he or she might conduct the design of the study. The design entails the process of collecting data, analyzing the data, and developing action plans and evaluation.

Although many educators do not need to develop an entire proposal in order to conduct an action research study, when this is necessary, a formal proposal would contain components similar to those of a quantitative or qualitative study (see fig. 2.5).

Variations exist in the actual components of a formal action research study, like any research study, but figure 2.5 represents the general framework. The proposal is similar to a complete study, except that the study would contain actual data, analysis of the data, and the findings. Also, both the proposal and study should contain an abstract that represents a one-page executive review of the entire proposal or study.

The proposal should begin with a subtitle called "The Nature of the Problem." The purpose of this section is to set the stage for the topic by writing about the topic in a general fashion with supporting sources and references. The researcher writes about the topic from a broad perspective and then narrows the scope of the writing to specifically address the researcher's own problem. Action research, unlike quantitative research studies, does not contain a hypothesis. The statement of the problem is substituted for the hypothesis. The statement of problem is, in general, a rather brief paragraph indicating precisely the problem being confronted. It represents a succinct description of the issue.

Most proposals contain a section called "Definition of Terms," which describes the main terms and how they are defined in the study. An action research study might also contain a subtitle called "Significance of the Study." Researchers should explain why this problem is significant and the reasons why making improvements can be helpful. Another subtitle that is often used in research is called "Limitations." Limitations are those factors that hinder the study from being ideal. Action research generally does not need to describe limitations of the study, although limitations could be identified. Examples of limitations might be a lack of random sampling of subjects, a lack of statistical analysis using tests of significance, and a lack of systematic data collection in a controlled setting. Lastly, some action research studies might contain a section called a "Conceptual Framework." A conceptual framework is used to provide a theoretical outline for the study and often includes courses of action or a preferred approach to the study.

Abstract

Table of Contents

Introduction

Chapter 1: Nature of the Problem
    Statement of the problem
    Purpose of the study
    Definition of terms
    Significance of the study
    Organization of the study

Chapter 2: Review of Literature
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Chapter 3: Action Research Design
    Subjects
    Procedures
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    Instrumentation
    Proposed action

Chapter 4: Proposed Analysis of Data
    Proposed presentation of data
    Proposed analysis of data

Chapter 5: Proposed Evaluation
    Proposed Procedure in evaluating
      results

References

Appendix

Figure 2.5.   Contents of an Action Research Proposal

CONDUCTING A LITERATURE REVIEW

The review of literature (chapter 2) is an important part of the study because it represents the body of knowledge relating to the topic. This helps the researcher learn about other studies that have been completed regarding the topic and their results. The researcher can obtain many useful ideas through conducting a review of the literature.

This literature search generally includes an extensive review of dissertations, professional publications, journal articles, books, publications, and sometimes personal interviews with expert people. Although the review of literature is common to qualitative and quantitative research, it is less important to action research. In action research, a review of past publications, benchmarking, and a technique of discovering the best practices of other people and institutions are often more valuable. In conducting a literature review, there are basically two types of sources—primary and secondary. Primary sources are materials that are written directly from the author. Examples include a dissertation, thesis, or scholarly journal article. Secondary sources are written by someone else and are considered second-hand sources. Examples include a book where the author reviews a primary source or a newspaper. Therefore, primary sources are preferred.

There are many references that can be used in conducting a literature review, such as Internet searches, indexes, books, technical papers, abstracts, original works, computer databases, journals, and professional handbooks.

Typical educational sources include the American Education Research Association, National Society for the Study of Education, *Review of Research in Education*, *The Handbook of Research on Teaching*, and *Encyclopedia of Educational Research*.

One of the more popular literature sources is the Education Resources Information Center (ERIC). This center contains a comprehensive online digital library of over one million bibliographic records, such as scholarly journal articles, books, papers, software programs, reports, and works from associations and organizations. This center is sponsored by the U.S. Department of Education's Institute of Education. When using ERIC, a search can be conducted by entering bibliographic data,

such as the author, title of the work, journal citation, and so forth. Most of the materials can be obtained at no charge. Other helpful features of ERIC include basic and advanced search functions, thesaurus, and My ERIC (which allows you to search and save your online searches).

When conducting your literature review, you should identify all sources that support and do not support your position. Many novice researchers take a biased viewpoint and attempt to mainly obtain sources that only support their position. It is important to present an honest and thorough literature review.

When writing your literature review, several styles can be used: point-by-point or journalistic. The point-by-point style contains a one- or two-paragraph summary for each source. While this approach may appear a little choppy to the reader, the use of effective transition statements can be used to help smooth out the writing. The journalistic approach, perhaps the more popular one, is done by writing the review more like a term paper, citing your sources along the way. Most literature reviews conclude with a summary table. The summary table summarizes the main sources in a concise format, allowing the reader to quickly review the sources.

SAMPLING TECHNIQUES

Chapter three consists of defining the subjects for the study, intervention and procedures, and proposed action to make improvements. The first step is to define the population for the study and sampling technique. *Sampling* is defined as selecting the subjects for a study from a specific population. There are several sampling techniques used in research, such as simple random sampling, stratified sampling, cluster sampling, systematic sampling, convenience sampling, and purposeful sampling (see fig. 2.6).

Random sampling provides a process in which each subject has an equal and independent chance of being selected. Simple random sampling is picking names from a hat. Random sampling is considered one of the best ways to select subjects from a defined population for a study because it provides a high probability that the subjects will represent the entire population.

Type of Sampling	Definition
Simple Random Sampling	Subjects have an equal and independent chance of being selected.
Stratified Sampling	Subjects are selected in equal-sized proportions.
Cluster Sampling	Selecting subjects who come from intact groups versus on individual basis.
Systematic Sampling	Selecting subjects from a list on a preset number basis such as every tenth person.
Convenient Sampling	Selecting subjects based upon convenience or on an accidental basis.
Purposeful Sampling	Specifically selecting subjects who are the targeted subjects for improvement.

Figure 2.6.   Methods of Sampling

Stratified sampling is a method of selecting equally sized subgroups of subjects from a known population. For example, if a researcher desired to gain the opinion from both male and female teachers, then he or she would select equally sized proportions of subjects from each group. If there were 100 male teachers and 50 female teachers, and the researcher desired an equal representation of 30 subjects, he or she might select 20 male teachers and 10 female teachers.

Cluster sampling is concerned with selecting random groups versus individuals, such as classes of students. For example, if a researcher desired 90 subjects, he or she might select three classes of 30 students from the population. Cluster sampling is useful for securing subjects from large populations or when there are intact groups, such as classrooms, and it is not practical or possible to select individual students. It can also be a convenient and quick process for selecting subjects.

Systematic sampling is rarely used in education. This sampling process involves selecting every preset number of people from a list (e.g., every tenth person). The formula is expressed by K = the number in population desired divided by the desired sample number. This expression results in a number representing K, such as $K = 10$, and, therefore, every tenth name would be selected. Systematic sampling is similar to the process used in physical education class whereby the coach calls out each student by number, and every tenth student is placed on a specific team. Systematic sampling is sometimes criticized for not being a truly random selection process since all the subjects do not have an equal and independent chance of being selected, and certain subgroups could be excluded. This can be reduced by ensuring that the subjects are randomly listed before selecting the subjects.

Convenience sampling is used as the term implies—the subjects are conveniently accessible. For example, a teacher may use his or her own class of students for the study. This type of sampling is not random, but in action research, the researcher is generally not concerned with the *generalizability* of the results. Generalizability refers to the extent to which the findings can be applied to the general population. Also, while statistical methods can be applied to data obtained by convenience sampling, the results are more valid and reliable when random sampling has been used for selecting the subjects for the study.

Purposeful sampling is a commonly used sampling technique in action research. Purposeful sampling selects those subjects who are the specific individuals for whom improvement is desired. In action research, the researcher generally has a defined target population in which he or she desires improvement, and, therefore, purposeful sampling is often the method of sampling. Purposeful sampling is also a popular method used in qualitative research because, similar to action research, the researcher is concerned with selecting "information rich" subjects and often has a predetermined target population identified.

BENCHMARKING

The strategy of benchmarking, which can be used as the literature search, is an outgrowth of the total quality movement and is a process

of identifying the best practices of other schools and adapting these practices as a basis for solving problems and making educational improvements. Benchmarking is similar to a literature review, except that it is less concerned with identifying academic and scholarly research publications and more concerned with identifying best practices. Establishing standards based upon nationwide school practices can be a crucial component in making educational improvements. *Dantotsu,* a Japanese term, means "striving to be the best of the best," which is the essence of the benchmarking philosophy (Camp, 1989).

The benchmarking process was first used by the Japanese to seek out the best practices of their competitors and adapt them for their own use. The notion is to obtain superiority by practicing what the best companies are doing and continuously striving to make quality improvements. Therefore, the ultimate goal of benchmarking in action research is to utilize this process to identify actions that can be used to solve the problem and make improvements. Benchmarking is similar to the literature review, except that it centers on identifying practical educational practices rather than published scholarly work, because the nature of action research is to solve the problem. However, when appropriate, a combination of benchmarking and literature review can be used in the action research process if the researcher believes that both are needed to address the issue (Tomal, 1998).

Several methods can be used in the benchmarking process (see fig. 2.7). For example, if the goal is to improve student reading, the researcher could utilize several benchmarking methods, such as visiting other school reading programs, contacting outside universities and vendors, consulting reading experts, attending professional association conferences, and reviewing magazines and journals on the subject of reading. The researcher might also assemble a team of fellow educators in which each of them could benchmark a different area. This teamwork would allow the benchmarking to be conducted more efficiently. The members could later pool their findings together for group discussion. The team could also collaborate in selecting the best method(s) to address the topic of reading. Although benchmarking can be a valuable method, the process requires a commitment of time and human resources, and the researcher needs to be willing to make this investment.

External Educational Source
- → Other school districts
- → Schools within the district
- → Colleges and universities
- → Libraries and resource centers

Internal Education Sources
- → Departments within the school
- → Experts within the school
- → School library and Internet

Informational Resources
- → Articles and journals
- → Government agencies
- → Professional organizations
- → Seminars and workshops
- → Commercial products

Outside Professionals
- → Professional consultants
- → Educational vendors

Other Contacts
- → Parents and community
- → Local school board members
- → Business and government

Figure 2.7. Methods of Benchmarking in Action Research

ETHICAL AND LEGAL CONSIDERATIONS

Researchers, regardless of the type of research they are conduct-ing, should always be concerned with protecting their subjects and avoiding legal problems. Nothing is worse in research than harming a research subject and being faced with a legal suit. Most institutions (e.g., colleges and universities) have a research committee on human subjects, which is a body of internal professionals that reviews and ap-proves any research prior to the start of the research study. This com-mittee is charged with ensuring that the proposed research conforms to institutional and professional standards in conducting research. Several professional organizations (American Psychological Associa-

tion and American Educational Research Association) have provided guidelines on research ethics and protocol (see appendix A).

Some of the ethical standards outlined by the American Psychological Association (APA) include: obtaining informed consent from the subjects, avoiding excessive financial inducements for participation, minimizing invasiveness (collection of information that could cause misconceptions or excessive risk to the subjects), ensuring that participation in the study is voluntary, agreeing to share information with the participants, agreeing not to deceive the participants, protecting the subjects from harm (physical, emotional, and mental), and taking reasonable measures to honor all commitments they have made to the participants (American Psychological Association, 1992).

Another organization that provides ethical, regulatory, and policy concerns regarding human subject research is the Institutional Review Board (IRB) Forum. The members of the scientific community participate in the IRB Forum in order to "create an atmosphere for open and respectful conversation about issues of mutual interest to members" (Irbforum.org, 2009). This organization provides useful information and resources especially related to medical and scientific areas. For example, information on "informed consent" taken from the Code of Federal Regulations Title 21 can be found on the IRB website. Definitions of informed consent from this document have been provided in appendix B.

CHAPTER 2 EXERCISES AND DISCUSSION QUESTIONS

1. Explain the history of action research.
2. List and explain the action research model.
3. List the steps in developing an action research proposal.
4. List the typical components (contents) of an action research proposal.
5. Describe ways of benchmarking.
6. List and describe ethical and legal considerations when conducting action research.
7. Describe the purpose of the IRB Forum.
8. List and describe five types of sampling.
9. Explain the drawbacks of systematic sampling.
10. Explain the difference between primary and secondary sources.

3

DATA COLLECTION METHODS

THE NATURE OF DATA COLLECTION

There are many methods to collect data in action research. Selecting the best method is a crucial aspect in ensuring the acquisition of relevant and valid information. The old expression, "garbage in, garbage out" applies to action research because if you fail to use the appropriate method of collecting data, your research will be compromised. In planning to collect data, the researcher also needs to consider the type of data analysis that will be performed. A common mistake of educators is to select a method of collecting data without planning for the best method of analysis. For example, if a researcher is planning to collect data through the use of a questionnaire, he or she needs to plan how the actual responses to each of the items will be analyzed. A pilot testing of the questionnaire and analysis of the data should be performed. This will allow the researcher to identify more appropriate methods of collecting data or the need to revise the design of the questionnaire so that it is more suitable for analysis. For example, the researcher might decide, after piloting the questionnaire, that a different type of scale is needed in order to complete a comprehensive analysis. It is best to identify these problems during the pilot phase rather than waiting until all the data have been collected. When planning for data collection,

some basic questions of who, what, where, when, and how should be addressed.

Who are the subjects of the study? Researchers should start with a clear understanding of the characteristics of the subjects of the study. For example, if the researcher is concerned with improving the reading ability of fourth grade students, then the method of data collection might depend upon the number of students and grade level at the school. If there are only a small number of students, then interviewing students might be more appropriate than conducting a questionnaire, which might be more appropriate for a large number of students. Also, the questionnaire might be useless if administered to a group of students who can't read. For example, if there is only one class consisting of 20 students, then the researchers may interview the teacher to gain information about the students' reading ability. Also, the decision whether to include the entire class in the study or to consider dividing the class in half and using two different types of methods needs to be considered. The type of data collection used could vary, depending upon the desired outcomes.

What data needs to be collected? The action researcher needs to take a strategic approach to determine what data to collect. Collecting unneeded data or the wrong kind of information can limit the study. For example, if there is concern with the reading ability of sixth grade students, the researcher needs to decide whether to collect reading scores from the class, homework assignments, assessments from parents, or standardized tests. Also, the researcher might need to collect data that can be later assessed to determine if actions to improve reading have helped. If the researcher cannot collect the same type of information, then the study will be compromised.

Where is the data? Two types of data are used to conduct an action research study. One is the *raw data* that will be collected and assessed in order to define the actual cause of a problem, which is the basis on which action plans can be developed. For example, this data could be the information collected from administering a survey to students regarding their study habits. The second type of data, called *benchmarked data*, is related information that is often collected in order to provide possible solutions for developing the action plans and making improvements. For example, if the data to be collected concern the reading

ability of students, then the researcher must also be able to benchmark and collect information regarding different viable reading curriculum, instruction, or intervention methods that could be used to improve the reading abilities of the students (i.e., benchmarked data). Assessing this type of information can help the researcher in deciding whether to conduct the action research and how much time and resources will potentially be needed. Moreover, the researcher might also plan to collect benchmarking information on reading while, at the same time, collecting the raw data from the subjects. This process could help the researcher be more efficient in the action research process.

When will the data be obtained? Just as important as collecting the right type of data is the researcher's ability to collect data at the appropriate time. For example, the data might best be collected during the beginning of the school year versus at a time when the students have more distractions, such as close to a holiday, scheduled activity, or end of the school year.

How will the data be collected? The researcher needs to be concerned with how the data is collected and whether consent forms or other confidentiality agreements should be used. Likewise, the researcher should be concerned with the method of collecting data so that it does not harm the students in any way, psychologically or emotionally. Also, the researcher should take care to secure the data so that the information does not have a negative effect upon the learning environment. Although numerous methods can be used to collect data in research, some of the more common methods used in action research are listed in figure 3.1.

Observing
➡ Direct observation
➡ Anecdotal notes
➡ Check lists
➡ Journals

Surveying
➡ Group surveys
➡ Individual surveys
➡ Two-way surveys
➡ One-way surveys

Interviewing
➡ Group interviews
➡ Focus groups
➡ Individual interviews
➡ Structured interviews

Assessing
➡ Portfolios
➡ Testing
➡ Records
➡ Recordings

Figure 3.1.   Methods of Data Collection

OBSERVING

Observing is one of the more popular methods of data collection for all research studies. The many techniques of observing range from structured observations using tally sheets to an open, unstructured approach. Whether the researcher uses a structured or open process, skill is needed.

Direct Observation

One of the advantages to using direct observation is the researcher's ability to obtain actual firsthand information regarding subjects. Direct observation can give the researcher the opportunity to collect data in a real-life situation that cannot be obtained through secondary information, such as self-reports and assessments. The researcher can also obtain information that is more reliable than relying upon data obtained from the subjects themselves or third-party individuals. However, there are some limitations. It is possible that if subjects know they are being observed, their pattern of behavior could be altered. For example, if a principal decides to observe a classroom, undoubtedly the performance of the students and teacher will improve. This concept is sometimes called the *Hawthorne effect*. This concept suggests that merely giving attention to people will cause their performance to improve. Researchers can use various techniques to reduce the Hawthorne effect, such as one-way mirrors or simply positioning themselves in the least conspicuous manner in the room (Mayo, 1939).

The observational technique can be more time consuming than using other data collection methods. If a larger number of subjects needs to be observed, then other methods, such as interviews, questionnaires, and assessments, might be more practical. However, even with the limitations, the advantages of the observational method can produce superior results for the researcher.

Whether an observer uses a structured or unstructured approach, the researcher should be aware of factors that hinder the observer in making accurate recordings (Frick & Semmel, 1978). Figure 3.2 lists some of the factors that hinder observations.

Factor: Halo Effect
➥ *Definition:* Tendency to always view subjects positively or negatively

Factor: Leniency Effect
➥ *Definition:* Definition: Tendency to give high observational ratings to all subjects—even when differences exist

Factor: Recency Effect
➥ *Definition* Definition: Tendency to give more emphasis to recent behaviors during the observational period

Factor: Central Tendency
➥ *Definition:* Definition: Reluctance to rate subjects either high or low and give average ratings

Factor: Rater Indecisiveness
➥ *Definition:* Definition: Inability to make categorical judgments about the subjects

Factor: Personal Bias
➥ *Definition:* Definition: Tendency to rate subjects based upon the observer's own prejudice

Factor: Contamination
➥ *Definition:* Definition: Any conditions that alter the natural setting of the subject's performance that is being observed

Factor: Observer Omission
➥ *Definition:* Inability of the observer to record all necessary subject behaviors

Factor: Observer Drift
➥ *Definition:* Tendency for observers to lose their concentration and fail to record information

Factor: Intra-observer Reliability
➥ *Definition:* Definition: Failure of the observer to consistently agree with his or her observational recordings

Factor: Inter-observer Reliability
➥ *Definition:* Failure of the observer to agree with other observers in collecting data

Factor: Criterion-related Observer Reliability
➥ *Definition:* Failure of the observer to record data that is in agreement with an established expert's criteria

Figure 3.2.   Factors That Hinder Observation

Observers must continually refine their skills to guard against these factors. One common problem for observers is the tendency to "see what they want to see." This inherent bias hinders the observer from being completely objective. For example, if a researcher is studying the misbehavior of children and he or she is frustrated with the high number of incidents, there might be a tendency to overrate any potential misbehavior that would not otherwise be considered a discipline problem. Therefore, it is important to establish criteria in which discipline offenses will be rated, as opposed to making general observations.

Another factor that can influence the effectiveness of observation is the degree to which the observer participates in the study (see fig. 3.3). If the researcher decides to become a *complete observer*, then he or she should not be involved in any interaction with the subject and try to remain as objective and neutral in the natural environment. For example, if a teacher is studying the play of early childhood students, then he or she should allow the children to play without being noticed. This allows the children to participate in their natural setting without any contamination or influence from the educator (i.e., obtrusive measure).

If the teacher decides to act primarily as a *participant observer*, then he or she needs to be well trained in the activity and disciplined in recording observations without being distracted from participation. Likewise, the *partial participant observer* needs to record information without becoming personally involved in the study. For example, it was once rumored that a researcher was observing the phenomena of the Billy Graham crusade. The researcher began the study by recording general observations. However, as the researcher continued, he became more and more interested in Dr. Graham's message being delivered, to the extent that at the end of the service, the researcher actually walked on stage and became part of the service. This is a vivid example of how

Type of Participant: Complete Observer
➡ *Definition:* A non-participant which is detached from the study

Type of Participant: Participant Observer
➡ *Definition:* The researcher interacts with the subjects while making observations

Type of Participant: Partial Participant Observer
➡ *Definition:* Researcher has limited interaction with subjects while making observations

Figure 3.3.   Degrees of Observer Participation

a researcher can be so personally involved with the study that he or she no longer can act as an unbiased observer. *Reflexivity* is the term that describes this phenomenon in which the researcher overly focuses on himself or herself as part of the phenomena and then no longer acts as an unbiased observer.

Anecdotal Notes

The method of collecting data through anecdotal notes is similar to qualitative researchers making field notes. Field notes are a form of direct observation and can easily transfer into anecdotal impressions. The idea of collecting field notes is to observe everything and anything. They are called *field notes* because the researcher collects information by observing phenomena in its natural setting, such as a classroom or school. A good example of making field notes is the work of famous qualitative researcher Jane Goodall. Dr. Goodall studied apes and monkeys in their natural setting. She actually lived within their environment and wrote observations in narrative form as she observed these animals in their natural habitat. The ability to make observations and then reflect on these narrative writings can allow the researcher to make general impressions and inductive conclusions (Bernard, 1994). The many methods of making field notes can be based upon pre-established time intervals, specified events, and crucial incidents. The anecdotal record is one that is particularly useful for educators (see fig. 3.4).

The key to making anecdotal notes is to quickly record any factual observations, such as incidents or behaviors, that are relevant to the study.

Date	Student Name	Comments
5-5	Stephanie	Appears sleepy, distracted and disinterested with doing work.
5-7	Stephanie	Appears engaged, motivated and in deep concentration with work.
5-9	Stephanie	Continues to be engaged and very helpful to other students in explaining how to perform work. Stephanie made comment that she likes the subject matter and helping people.

Figure 3.4.   Observational Anecdotal Form

This record can be very useful in recording information that can be later reflected upon. The researcher Piaget used this method to record his observations when he studied his children's development. Anecdotal notes can be recorded by using sheets of paper, index cards, computer software, or any other methods that allow the action researcher to conveniently record observations and organize the material (Piaget, 1926). The researcher can then perform an analysis of anecdotal notes after collecting the data (see fig. 3.5).

Checklists

The use of checklists is a quantitative way to conduct a structured observation. Checklists can serve as a valuable tool for ensuring that the researcher records timely and accurate observations. For example, the researcher might find it difficult to record general observations without a structured set of factors to help provide guidance. The researcher can use several different types of recording observations with checklists, such as duration recording, frequency recording, interval recording, and continuous recording (Gall, Borg, & Gall, 1996).

The *duration recording* is a method in which the observer records information during a specific, elapsed period of time. For example, the observer might record observations while a student is "on task" or "off task" and is engaged or not engaged in activities. The *frequency record-*

Date: 6-2
Student: Justin
Class: Fourth Grade
Observer: Jonathan
Analysis: Based upon the analysis of Justin's performance and behavior over the past week, my impression is that he is a student who either is totally engaged with the subject matter or is disinterested. Justin seems to be most disinterested when working alone. However, he seems to be highly engaged when allowed to work with other students. He has a strong need to develop a helping role for other students, especially when he is able to explain the material. He appears to be a child who needs to work with other students in a collaborative fashion, especially if he can be the leader. Therefore, my impression is that Justin is best suited for cooperative or collaborative teacher environments as opposed to working alone. This impression is supported by my talking with Justin and asking his preference. His statement, based upon my direct questioning, was, "I like working with other students, and it's fun to act as the teacher in the classroom, too."

Figure 3.5. Anecdotal Notes and Analysis

Date:_____   Student:_____   Gender: _____
Time:_____

Directions: Please mark a check for each time the following behavior is observed.

Student takes notes:	_____	Total:_____
Student asks questions:	_____	Total:_____
Student responds:	_____	Total:_____
Student looks confused:	_____	Total:_____
Student works cooperatively:	_____	Total:_____
Student gives answer:	_____	Total:_____

Figure 3.6. Sample of Observational Checklist

ing technique allows the observer to make a tally mark on the checklist each time he or she observes a pre-specified behavior. The *interval recording* involves the observation of behavior at predetermined intervals, such as every three minutes. The observer records the student's behavior at each three-minute interval. *Continuous recording* involves observing all pre-specified behaviors of a student during the observation interval. Because it is difficult to observe all behavior, the observer must focus on specific incidents or behaviors. Checklists can be especially helpful in keeping track of student descriptions, such as gender, time, age, and conditions (see fig. 3.6).

Journals

The use of journals is similar to the method of anecdotal recording. Although there are different types of journals, such as logs and diaries, essentially the researcher is observing the situation (i.e., students in a classroom) and making narrative recordings. A log tends to be a more detailed description of events and incidents, and a diary tends to be more of a personal account of one's feelings and events. Therefore, a journal can be considered as a method of recording the behaviors, feelings, and incidents of subjects (see fig. 3.7).

The use of journals can be very helpful for researchers in observing behavior and making a detailed analysis. However, although the use of journals might require more time than making anecdotal notes, journals allow the researcher to obtain more detailed info mation.

Student: Mary
Observer:
First Entry: 5-7
I noticed that Mary is very receptive and is diligent in completing her work.
She is very observant and is quick to answer questions and is helpful of her
fellow students. She does tend to have more difficulty when completing math.
When she experiences difficulty she tends to close up and become more
introverted. She is reluctant to ask questions when she has difficulty with
the subject matter.

Second Entry: 5-9
I noticed that Mary is very enthusiastic and talkative as she completes her
social studies material. She clearly grasps the material and is very
confident.

Third Entry: 5-11
Again, Mary is experiencing difficulty with mathematics. Her behavior is
consistent with becoming more introverted when having a difficult time with
subject matter. She tends to not ask questions or seek assistance.
Therefore, it appears that I need to pay close attention when Mary
experiences difficulty and give her probing questions to support her
learning.

Figure 3.7.   Researcher's Journal Log

INTERVIEWING

Conducting interviews can be a powerful technique for an action re-
searcher. Interviewing consists of asking questions of an individual
or a group of individuals and obtaining their verbal responses. The
respondents generally give their candid opinions, which are then di-
rectly recorded or paraphrased by the interviewer. Also, the interviewer
can transcribe these responses from audiotape, videotape, computer
software, or handwritten notes. Although the interviewer is primarily
concerned with getting verbal information from the respondents, valu-
able observations can be made from observing their behavior while re-
sponding that might not be obtained through the use of questionnaires.
The interviewing technique also has the advantage of allowing the
interviewer to engage in an in-depth discussion with the respondents,
which can often lead to more useful and richer information. Also, the
researcher can structure his or her questions based on specific areas of
interest, which that can elicit different types of responses (see fig. 3.8).

There are some disadvantages in using the interviewing technique,
such as time limitations, potential inaccuracy of interpretations of the
participant responses, difficulty in interviewing a large number of peo-
ple, and possible participant discomfort with the interviewing process.

Individual behaviors

Group behaviors
- ▶ Social dynamics
- ▶ Feelings and emotions
- ▶ Scenarios and situations
- ▶ Environment
- ▶ Processes and organizational issues
- ▶ Change situations
- ▶ Roles and responsibilities
- ▶ Factual events
- ▶ Motives and emotions
- ▶ Triggering events and conditions
- ▶ Objects, places, and time frames

Figure 3.8.   Types of Questioning Techniques

Regardless of whether the interviewer conducts a group or individual session, the basic steps for conducting an interviewing session are the same (see fig. 3.9).

The first step in conducting the interview is to *prepare the questions*. The questions should be tailored, based upon the information that the researcher wants to obtain. If the researcher is planning to interview a

| Step 1: Prepare questions | Step 6: Conduct questions |
Step 2: Plan logistics	Step 7: Record responses
Step 3: State opening	Step 8: Summarize the sessions
Step 4: Establish rapport	Step 9: State the next step
Step 5: Obtain written consent	Step 10: Thank the interviewee
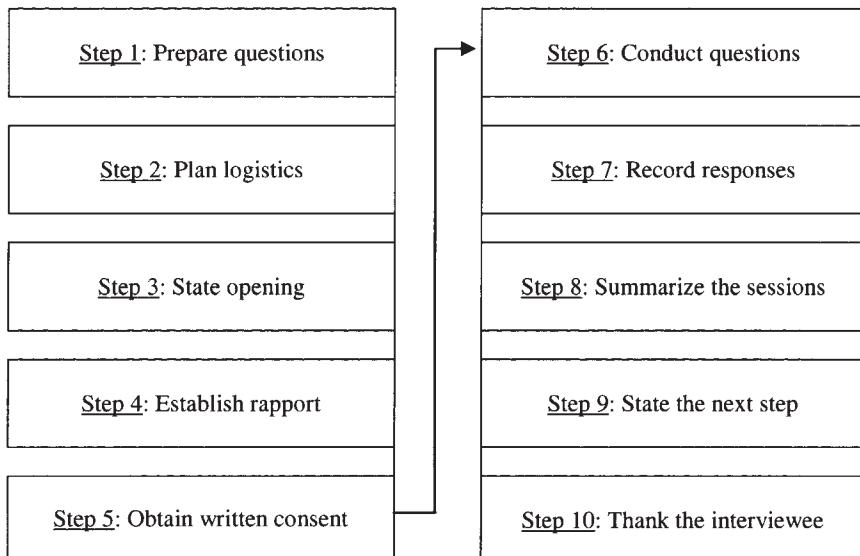
Figure 3.9.   Steps in Conducting an Interview

student regarding his or her difficulties in learning, the questions can be structured based upon feelings, situations, and behaviors that best elicit responses and get to the root of the problem. It also might be important to pilot the questions with a small group of experts or respondents before the interview session.

In step two, the researcher should *plan the logistics* for the session. It is important to find a suitable location for the interviewees so that they will feel comfortable. This location should be in a quiet place with little distractions or potential for interruptions. For example, if the researcher selects the teacher's office or administrator's office, the student might feel very uncomfortable, given that it is not familiar territory. It might be more practical to find a neutral location, such as the student's study hall or classroom.

The third step of the interview involves the *opening*. Here, the researcher needs to set the stage regarding the purpose of the session and the ground rules, such as: it is an informal interview, the respondent should answer questions candidly and honestly, and the researcher should state the time length of the interview. The fourth step involves *establishing rapport* with the interviewee. It is crucial that the researcher always be courteous and try to obtain the trust of the interviewee. Without this trust, it is very difficult to obtain the desired information and data. A simple approach in establishing rapport might be for the researcher to begin by simply asking the interviewee how he or she feels about participating in this session. The interviewer can then give his or her own feelings about past participation in interviews as a way to develop common ground. The interviewer might also extend appreciation to the interviewee for taking his or her time for the session or complimenting the interviewee for his or her participation.

Step five involves *obtaining a written consent* from the interviewee, which gives permission for the interview session. The consent form should contain information regarding confidentiality, anonymity, privacy, benefits of the research, purpose of the information, intentions of the study, and the fact that the session is voluntary. The interviewer might also offer to give the interviewee a copy of the questions or study when completed. Asking the interviewee for a written consent is best obtained after rapport has been established. Otherwise, the interviewee

might be more reluctant to agree to the consent form, and the interview session might need to be aborted.

Step six consists of the researcher *asking questions*. It is important that the interviewer avoid asking leading questions (i.e., questions that bias the interviewee's responses) so that the interviewee can give his or her candid responses without influence from the interviewer. There are several methods of asking questions (see fig. 3.10).

Open-ended questions are structured so that the interviewee is forced to respond with one or more statements. Examples include, "What did you like about the lesson today?" and "What are the things you like best about your teacher?" Open-ended questions can be very powerful in obtaining a lot of information from the interviewee, although it can be ineffective and time consuming if the interviewer only is concerned with a "yes or no" response. *Close-ended questions* are best when the interviewer desires a brief "yes or no" answer. Typical closed-ended questions are "Did you like the lesson?" and "Do you like your teacher?"

The use of *paraphrasing* can be a useful questioning technique when the research interviewer desires the interviewee to elaborate. The paraphrasing technique consists of the interviewer simply putting in his or her own words what the interviewee stated. This can be good in drawing out additional information from the interviewee. *Reflection* is an interviewing technique that simply consists of a restatement of the interviewee's comment. For example, if the interviewee states that he or she feels sad in class, the interviewer would simply respond by saying, "You feel sad in class?" Restatement techniques can force the interviewee to continue talking and elaborate.

Expanders are simply short words or expressions that the interviewer can state that will cause the interviewee to continue talking. Examples include: "Go on," "I see," "Is that right?" "Okay," and "Good." The last technique, the use of *silence*, might appear ironic as a questioning

▶ Open-ended questions
▶ Closed-ended questions
▶ Paraphrasing
▶ Reflection
▶ Use of expanders
▶ Silence

Figure 3.10. Examples of Questioning Techniques

technique, but sometimes the best questioning technique is to not ask a question at all. The use of silence can force the interviewee to begin talking and can be more powerful in gaining information than asking structured questions that could stifle the interviewee from freely talking.

The last steps in the process consist of *recording the responses*, *summarizing the session*, *stating the next step* in the research process, and *thanking the interviewee* for participating in the interview. The researcher should always give his or her best estimates for completing the study so that the participants do not develop unrealistic expectations.

Group Interviews

There are several methods in conducting interviews. The *group interview* is one that consists of asking questions to two or more people who have gathered for a session. It is important to select people who can make a contribution to the interview session. Otherwise, one or more ill-selected people can interfere with the interviewing process, and the researcher will fail to get good results. The interview process has been popular for professionals in many fields of study, such as sociologists, psychologists, educators, and health care professionals. To conduct a group interview, the interviewer requires a great deal of skill. He or she needs to be able to pay attention to all the participants of the group and ensure that everyone contributes. The interviewer needs to have good facilitation skills in controlling dominating individuals and drawing out responses from shy individuals.

There are several types of difficult participants in a group interview (see fig. 3.11). The *excessive complainer* is the type of interviewee who takes advantage of the session by expressing his or her negative feelings. These complainers have a certain characteristic sound. If you listen to them, it sounds almost melodic. They also use a lot of "ands" and "buts." Complainers often have the ability to switch from one topic to another without hardly taking a breath. Although the interviewer might gain a lot of information, the complainer generally gets off topic and needs to be controlled. In essence, complainers are people who develop a sense of powerlessness. They often see causes of their problems as being outside influences, such as fate or other people. Therefore, when problems

Type of Difficult Interviewee: The excessive complainer interviewee
➡ *Managing Technique:*
- State, "I understand your feelings"
- Don't reinforce
- Ignore the complaint

Type of Difficult Interviewee: The hostile interviewee
➡ *Managing Technique:*
- Don't argue
- Stick to the facts
- Be firm but let them save face

Type of Difficult Interviewee: The long-winded interviewee
➡ *Managing Technique:*
- Paraphrase
- Provide restatement
- Don't reinforce
- Interrupt and suggest specific response

Type of Difficult Interviewee: The shy interviewee
➡ *Managing Technique:*
- Ask open-ended questions
- Use paraphrasing techniques
- Use expanders

Type of Difficult Interviewee: The drifter interviewee
➡ *Managing Technique:*
- Don't reinforce
- Say, "I understand," and redirect
- Stick to the interview topic

Figure 3.11. Handling Difficult Interviewees

are encountered, the complainers are more apt to blame others than to accept it and try to logically understand the root cause of problems. In dealing with complainers, try not to produce an adversarial relationship. The researcher might start by paraphrasing or restatement, such as "Okay, I understand" or "Let me see if I can paraphrase this." The researcher should also try not to apologize for the complainer's excessive complaints but rather try to move to problem solving with the complainer to gain the information needed.

The *hostile interviewee* can be difficult to control. This individual is generally abrupt, abrasive, and emotional. The hostile person is not the most common type of interviewee but certainly is one of the most difficult to manage. They generally have a deep sense of feelings about

the way others should behave, and there is often a noticeable degree of anger and distortion of real facts. They are generally inconsiderate to the interviewer. The hostile individual also has a very negative attitude and sometimes believes that outside influences are overwhelming. They often disregard the positive aspects and tend to focus only on the negative. They reinforce this attitude until it often becomes a consistent pattern. It is essential that when dealing with a hostile interviewee, the researcher does not develop an adversarial relationship. He or she should give direct eye contact, de-escalate any conflict or negativity, and not be overly polite.

The *long-winded interviewee* can disrupt the entire group by not allowing others to speak and often gives a biased view of the group's opinions. This person often comes across as a know-it-all. He or she is generally very confident and appears to have all the answers and often generalizes about the problem from a biased viewpoint. In dealing with him or her, the researcher should make statements like, "I appreciate your responses; now can I hear other opinions, too?" Also, the interviewer can use paraphrase and restatement techniques to help control this dominating person.

It can be difficult for the interviewer to extract information from the *shy interviewee*. This person often feels uncomfortable giving opinions in a group setting and might be hard to understand. He or she might have a sense of mistrust and feel embarrassed giving information in a group setting. Therefore, in managing this type of interviewee, it is important to use open-ended questions, paraphrasing, and expander techniques.

The *drifter interviewee* is the type of person who takes discussion off track. This individual might focus on personal issues rather than the topic of the interview session. The interviewee might want to take advantage of the session for hidden agendas or personal motives. In dealing with this type of interviewee, it is important to redirect the individual to the topic and not reinforce this behavior.

Focus Groups

A special type of group interview is called a *focus group*. A focus group generally consists of about five to ten people who are inter-

viewed in a comfortable, nonthreatening setting. Although the interviewer might ask questions of the focus group, the participants often just share their feelings and perceptions while the interviewer records their responses. The focus group might also have an internal facilitator who helps to direct questions or record their responses. Sometimes, responses can actually be recorded on a flip chart or newsprint. The interview questions can be placed on the top of several flip chart sheets and, when filled with responses, taped to the wall so that everyone can see the information.

Although there are different variations of conducting a focus group, the most common, from an action research standpoint, is to ask questions of the members and then record their responses. It is important to allow the participants to have freedom and responsibility for eliciting responses from everyone within their group. The focus group operates best when all members have a common interest and are genuinely interested in obtaining everyone's views within the group. It also is important to select several participants for the group so that there are enough people to provide a representative sample but so many that discussion is stifled. In preparing questions for the focus group, the interviewer could first develop a set of questions and then pilot the set of questions with experts or one or two individuals to ensure that the questions are appropriate. Figure 3.12 gives an example of questions that could be asked of a focus group on the topic of discipline.

Individual Interviews

Conducting the individual interview requires skills different from those for conducting a group interview. Conducting an interview with one person can be valuable in drawing out true feelings that might not be obtained in a group setting. Because the goal in action research is to solve problems, it might be necessary to conduct an individual session because the root problem could be with just one person. For example, if a student has a disciplinary problem, the researcher might need to conduct a counseling session with the student to resolve the issue (Tomal, 1999). Although the process of asking questions might be similar in an individual interview as in a group interview, one variation to the interview process is called the *coaching session* (see fig. 3.13).

▶ How do you feel about the use of corporal punishment?
▶ How important is due process?
▶ Do you believe schools should use a zero tolerance policy?
▶ Should mitigating circumstances be considered in giving disciplinary action?
▶ Do you believe in progressive discipline?
▶ What is the teacher's responsibility and authority in administering discipline?
▶ How should discipline be administered to students with disabilities?
▶ Where should the disciplinary session be administered?
▶ What is the relationship between school discipline and search procedures?
▶ What are some legal aspects in administering discipline?
▶ How should schools deal with violent offenders?
▶ How should a school develop a uniform policy?
▶ What are reasons for disciplining students?
▶ Should counseling be a first step to the discipline procedure?
▶ Do you think peer mediation programs work?
▶ What is the role of parents in school discipline?

Figure 3.12.   Example of Group Interview Questions on the Topic of Discipline for a Focus Group

Step one of the coaching session begins by describing the *expected behavior*. The teacher should start the session by explaining the process, describing the expected behavior required of all students, and stating the school policy. Too often, teachers are quick to blame a student for an issue without first describing the school's policy and expectation for good student behavior. By stating the expected behavior standard, the teacher confirms the school's policy on performance expectations.

In step two, the teacher should state the *unacceptable behavior*. The teacher should describe the student's misbehavior in a neutral, but firm, manner. He or she should give specific examples and actual facts to support the allegation. Documentation as well as statements by witnesses can also be helpful in supporting the allegation. During this step, the teacher should be careful not to personally belittle or degrade the student or create an intimidating atmosphere.

Step three consists of asking the student the *cause of the problem*. It is important that the teacher consider possible causes that could have contributed to the misbehavior, such as peer influence, home environment, aptitude, attitude, motivation, or health conditions (e.g., behavioral or learning disability). Often if the teacher considers these causes, there is a good chance that one of them will be the root of the student's problem.
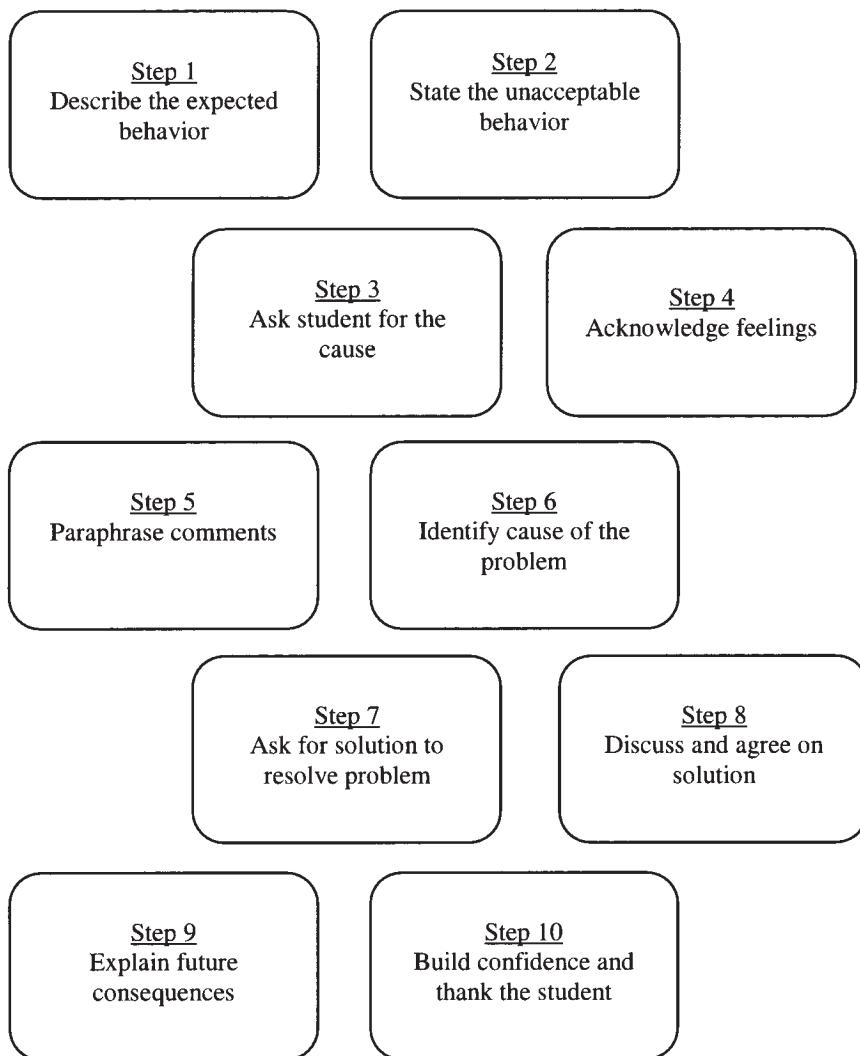
Figure 3.13. Steps in Conducting Coaching Interview Session

During this step, it is also important that the student acknowledges his or her responsibility for his or her actions (Tomal, 1999).

In step four, the teacher needs to *listen* to the student and then *acknowledge* the student's feelings. Whether the teacher agrees or not with the student, it is important that the teacher gives his or her full attention to the student, empathizes with the student, and maintains rapport. The

student might express remorse, anger, or hostility. The teacher might respond by stating, "I understand how you feel in this situation" or "I see how someone would have feelings like this in this situation." Recognizing the student's feelings helps to personalize the conversation and develop rapport, which can help in resolving the issue. Even if the student is perceived as being cold and indifferent, the teacher still needs to recognize his or her feelings.

The next step involves *paraphrasing* the student's statement so that the teacher can confirm and document the actual comments made by the student. This technique also helps to promote further discussion so that the issue can be resolved. In step six, the teacher should *identify the cause of the problem*. This step often entails an in-depth discussion because students are often reluctant to give the cause, or they have not thought about the reason for their misbehavior. Step seven involves *solving the problem*. It is best to begin by asking the student for solutions. A student is more likely to change his behavior if he has participated in the solution. For example, if the student suggests an appropriate solution to the problem and it is agreeable to the teacher, then the teacher should agree with the student. If a student suggests a solution that is inappropriate, then the teacher needs to further discuss the problem and consider offering his or her own *solution* (step eight). If the student is unwilling to consider any reasonable option, then the teacher will have no choice but to impose his or her own solution to the problem.

Step nine involves *indicating future consequences* for continued misbehavior. This step requires that the teacher explains the consequences of misbehavior and ensures that the student recognizes the further consequences. The last step involves *supporting the student and building confidence*. It is crucial that the teacher reinforces a positive atmosphere and states to the student that he or she can improve. Although it might be difficult at times for teachers to give this support, an attempt to restore a positive working relationship is crucial to resolving the issue and making improvements. Teachers should also use appropriate body language. The subtle nonverbal cues and signals that a student notices can communicate a teacher's feelings toward a student. Last, the teacher should *thank the student* for participating in the individual interview session. The teacher might want to document

the results of the session, which could be necessary for future actions (Tomal, 1999).

The effective interviewer is one who can quickly establish rapport with the interviewee and obtain relevant information. One of the more practical theories in helping an interviewer in communicating with a person is the use of personality styles. The theory of personality styles is an outgrowth of the work of Karl Gustav Jung. Jung, a Swiss psychoanalyst, and student and colleague of Sigmund Freud, articulated the basic theory of personality (Jung, 1923). He believed that people had four personality styles and that most individuals have a dominant personality style, genetically determined, that can even be observed at the infant stage. As an outgrowth of Jung's work, four styles were identified: intuitor, feeler, thinker, and doer (Tomal, 1999).

The *intuitor* personality style has communication characteristics of being theoretical, abstract, introspective, conceptional, and tends to communicate with respect to the time frame of the future. They place an emphasis on ingenuity, creativity, and originality. Intuitors are often verbose, intuitive, imaginative, and expressive during interview sessions. They tend to communicate in a unique, novel, or conceptual manner. However, although intuitors appear to be insightful, they are often criticized for being impractical or unorganized. Therefore, the interviewer might need to keep the interview structured.

The *feeler* personality style is one who values feelings and emotions of people. During an interview, feelers are often very personal, good listeners, and tend to be very respectful to the interviewer. They also might exhibit behaviors of being perceptive, sensitive, warm, and empathetic. Given that feelers are people oriented, they may also come across as spontaneous and introspective during the interview. However, at their worst, they can be seen as impulsive, overdramatic, moody, and emotional. Therefore, it is important to ask a variety of well-rounded questions because they tend to focus on people, feelings, and emotions.

The *thinker* personality style tends to have characteristics of being objective, logical, and analytical during the interview session. Thinkers can be effective in organizing their thoughts and presenting them in a clear and detailed manner. However, they tend to be indecisive in answering questions and prefer to ponder information for a long period of time instead of making a quick decision. Their strengths during interview

sessions include being deliberate, objective, and analytical. Their weaknesses include being too rigid, overcautious, controlling, systematic, and stoic.

The *doer* personality style is practical and results oriented. During the interview, doers will probably communicate in short and to-the-point statements. They are less likely to engage in personal collaborative discussions that are emotionally based. The doers strengths include characteristics of being pragmatic, efficient, and straightforward in giving responses. However, their weaknesses include characteristics of being too combative, demanding, impatient, insensitive, and short-sighted.

Understanding the use of the personality styles can help the interviewer in conducting interview sessions (see fig. 3.14). For example, individuals with similar styles tend to communicate more effectively with each other. They tend to "talk the language" of the other person. However, two people (i.e., interviewer and interviewee) with dissimilar personality styles might encounter miscommunication. For example, if the interviewer tends to be a thinker, and he or she is interviewing a

Personality Style: Intuitor
  ➥ *Characteristics:*
    • Be enthusiastic
    • Focus on creativity and innovation
    • Allow for flexibility and freedom

Personality Style: Feeler
  ➥ *Characteristics:*
    • Personalize discussion
    • Be concerned with feelings, uniqueness, and individuality
    • Relate experiences based on emotional reactions, feelings, warmth, and empathy

Personality Style: Thinker
  ➥ *Characteristics:*
    • Present information in an organized, structured manner
    • Don't push for immediate action and responses
    • Be logical and data oriented and present things in a logical fashion
    • Be more analytical and quantitative

Personality Style: Doer
  ➥ *Characteristics:*
    • Be practical and concrete, spirited and down to earth
    • Use physical, practical examples in discussions and be succinct in questioning

Figure 3.14.   Personality Styles During Interview Sessions

personality who is dominantly an intuitor, the interviewer might appear to the person as being overly controlling and lacking ingenuity. The interviewer might overwhelm the interviewee, and he or she may not listen or actively participate.

On the other hand, if the interviewer is a doer personality style and the interviewee has an intuitor style, conflict could arise. The interviewer might be viewed as being too impulsive, quick, and bottom-line oriented. The interviewee might become frustrated and impatient and desire a more creative, innovative, or animated approach to the interview session, instead of being too down-to-earth and succinct.

The use of personality styles can be a useful aide when conducting interviewing sessions. The key to communicating effectively with interviewees begins with identifying one's own dominant style and then the style of the other person. This does not mean that the interviewer must permanently change, but rather adapt his or her approach to the interviewee(s). For example, when interviewing a person who is a dominant thinker, extra time might need to be taken to organize the questions and talk in a structured manner. When approaching an intuitor, an interviewer might want to be more dynamic and offer more thought-provoking statements. When dealing with a thinker, the discussion should be more structured and organized and presented in a step-by-step fashion. The feeler might also need time to contemplate and process information as compared to the doer, who might be more inclined to give his or her opinions. Doers, however, might just want to give quick answers to questions, and the interview session may be short-changed in getting in-depth information.

One of the potential difficult aspects a person might encounter during an individual interview is defensiveness. When people become defensive, they often resort to using *defense mechanisms*. Defense mechanisms are psychological crutches that people utilize to prevent themselves from experiencing negative feelings (see fig. 3.15).

Denial is a defense mechanism when people simply deny their own behaviors or feelings about a situation. For example, if a person is asked an uncomfortable question during the interview, he or she might give an untruthful response rather than experience potential embarrassment. *Projection* is a technique where an individual transfers his or her feelings to another person. For example, a student might state, "I am not

Figure 3.15.   Defense Mechanisms Used During Interview Sessions

▶ Denial
▶ Projection
▶ Reaction formation
▶ Fantasy and idealization
▶ Avoidance
▶ Aggressive behavior
▶ Displacement

tired; she is tired" or "I'm not disorganized; you are disorganized." It is important for the interviewer to watch for these patterns in people, which can give clues to their actual feelings, and to ask follow-up questions to gain clarification or verification of their responses. The use of *reaction formation* is a defense mechanism used when the interviewee states the total opposite of what he or she feels. For example, instead of stating that the student dislikes class, he or she might say that class is enjoyable. This is a way to prevent the student from facing his or her true feelings and experiencing negative feelings. The use of *fantasy and idealization* is a defense mechanism in which students have unrealistic opinions. They might fantasize about others (e.g., movie stars, music performers) and give responses during the interview based upon their ideal perceptions of themselves.

The use of *avoidance* is a very common technique where people simply avoid answering questions rather than face their true feelings. During the interview session, an interviewer might encounter *aggressive behavior*. In this situation, the interviewer should be sure to establish rapport and always give courtesy and respect to the interviewee. The use of *displacement* is a technique whereby a student blames another student or takes his or her negative feelings and transfers them to another person. The student might make statements such as, "I don't like my fellow student; she is always teasing me." Students use this technique to save face rather than take ownership for their own behavior.

Structured Interviews

Structured interviews are sometimes called *formal interviews*. This interview consists of predetermined questions. The structured interview can be an efficient process, although it does not allow for flexibility in gaining information. The questions tend to be closed-ended questions that require

a "yes or no" answer or a short response. Generally, the interviewee is not allowed to follow up by providing additional information that could be relevant. The structured interview is similar to asking a set of questions based on items from a questionnaire. The typical telephone interview is a common example of a structured interview session.

A variation of the structured interview is the unstructured approach. The types of questions used in this interview allow for a great deal of latitude for the interviewee. Interviewers tend to ask open-ended questions, such as: What classes did you like best in school? Which were your favorite teachers and why? How did your teachers make learning interesting? What were some of the most rewarding experiences in school? These questions often provide rich and in-depth responses. For example, if conducting an unstructured interview session with a group of students concerning what motivates them in class, the questions include: Do you feel motivated by learning the material itself? Does recognition motivate you? Does the use of rewards provide incentive for motivation? What things demotivate you from wanting to learn?

SURVEYING

Conducting a survey is, without a doubt, one of the most popular and effective techniques for data collection in action research. A survey is used to obtain opinions from people regarding their feelings, beliefs, impressions, and facts about almost any educational issue or problem. Although different formats are used in conducting a survey, the main objective is to ask questions directly of people to get information that can be later analyzed and then used to develop action plans to address educational issues. Although most surveys tend to be administered through a questionnaire to a large number of people, surveys can also be conducted on an individual basis and administered through the Internet, over the telephone, via fax, or in person.

Group Surveys

Traditionally, surveys have been used when there are a large number of people in the sample population, and conducting personal interviews

would be impractical and time consuming. This survey is called a *group survey*. However, the use of the survey has evolved in action research and is used for many different purposes, such as surveying a person, an entire classroom of students, the teachers and parents, or all stakeholders of a school district. Figure 3.16 shows an example of some of the topics in which surveys have been used to obtain information.

Although surveys have many uses, they can be especially helpful in conducting longitudinal and trend studies. These types of studies collect information at different points in time and when assessing different samples from populations whose participants have changed and the researcher wants to make a comparison. Surveys can also be useful as a follow-up to evaluate the results of implemented actions. The use of follow-up surveys cannot always determine valid changes because the surveys have been administered at different points of time historically. However, the information can be helpful in supporting the action researcher's opinions in evaluating actions. For example, a principal could administer a survey to assess the opinions of teachers regarding the operations of the school. She could then implement actions for school improvements and then reassess the teachers' opinions with a follow-up survey. Because the surveys are administered at different points in time, other external factors could influence the teachers' opinions. However, the information from the two surveys can be compared and be valuable in helping the principal in her assessment. Likewise, a teacher could administer a survey to all of her students regarding her teaching style. The teacher could then assess the students' opinions, implement actions to make instructional improvement, and administer a follow-up survey to assess the results. This form of action research can be valuable in

▶ Determining attitudes of adolescent student reading instruction
▶ Assessing teachers' opinions regarding class size reduction program
▶ Determining if time-out techniques are effective in enforcing discipline rules
▶ Assessing parents' opinions regarding gifted placement program
▶ Determining the effectiveness of laptop computers on standardized test scores
▶ Assessing special education teachers' attitudes toward inclusion
▶ Identifying health program practices for early Head Start programs
▶ Identifying qualitative learning techniques on mathematical achievement
▶ Assessing the impact of character education on student performance

Figure 3.16.   Example of Action Research Topics for Using Surveys

assisting a teacher in collecting information in an anonymous and confidential manner. Students will be more likely to give candid and honest responses if a survey is used rather than through personal interviews with the teacher.

Given that action research is less exact and precise than scientific research, it is important that an action researcher resist the temptation to be careless. The process of conducting a survey should be systematic and thorough. Typical problems in conducting a survey consist of improperly defining the population, neglecting to establish sufficient resources prior to starting the survey, failing to pilot the questionnaire, and being too hasty is designing the items for the questionnaire (see fig. 3.17).

For example, a common problem in administering a survey is the action researcher's failure to properly plan for the entire sequence of events. For example, if the survey is administered to a large group of participants and a problem in the questionnaire is discovered, then the entire survey might need to be redone. This problem can be prevented if the questionnaire is first pilot tested with a small group. Another common problem is the failure to have a precise plan for analyzing the data prior to administering the questionnaire. Without a clear and defined process for analyzing the data, the researcher might need to construct the items on the questionnaire differently. Figure 3.18 lists the steps in conducting a survey.

Step one in conducting a survey is *identifying the problem*. The action researcher must first identify the educational problem and what he or she would like to improve. Generally, this requires writing a well-defined statement of the problem. For example, the researcher might desire to improve the instructional skills of teachers, the math achievement of students, or the morale of students in a classroom. This

▶ Improperly identifying the target population
▶ Poor planning of resources
▶ Poor design of questionnaire items
▶ Failing to pilot the questionnaire
▶ Poor planning of survey administration
▶ Failing to properly decide data analysis prior to administration
▶ Failing to consider all questions that need to be addressed

Figure 3.17.   Problems in Conducting Surveys
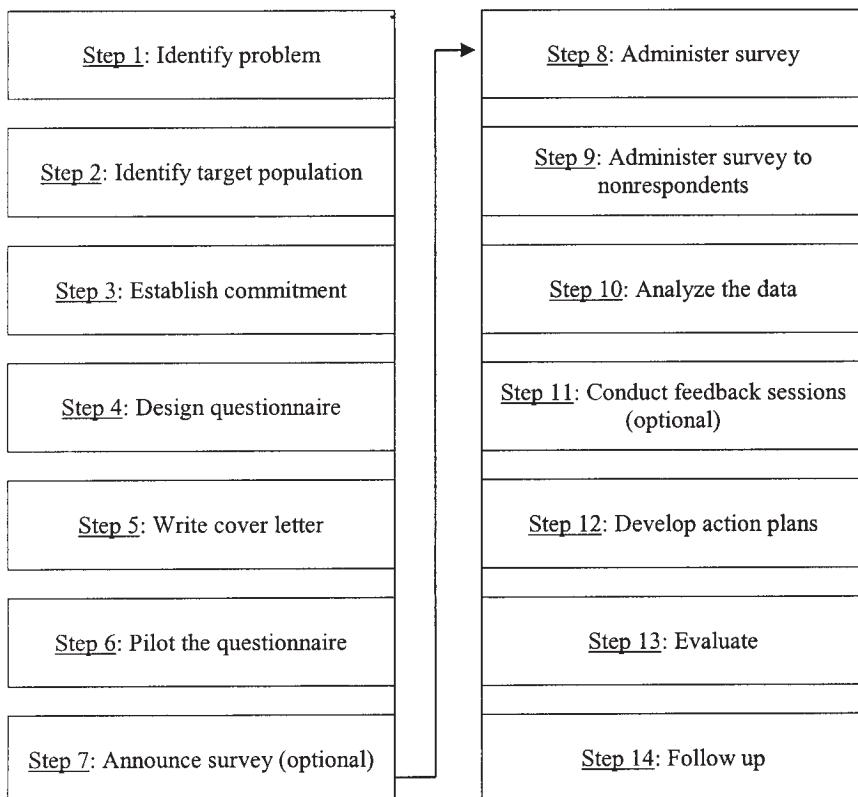
Figure 3.18.   Steps in Conducting a Survey

first step allows the researcher to decide on the actual objectives of the survey and determine if the survey is the best method for addressing the problem. If the researcher wants to identify the skill areas needed for staff development in order to design a suitable training workshop, then a survey might be an appropriate approach. However, if the researcher would like to improve the disciplinary behavior of a student, an interview with the student might be more appropriate than a survey. Likewise, if a researcher is concerned with improving the math achievement of students, he or she can assess the students' level of math proficiency and then administer an action step to improve their ability rather than administering a survey, which would be of little value. In identifying the problem definition, some possible questions the researcher can ask include: What is the educational problem? What is the intended

outcome? Will a survey be the best method for collecting data? Should another intervention method be used along with the questionnaire? What is the time frame available to conduct the survey?

Once the researcher has defined the problem, he or she must clearly *identify the target population* (step two). The exact participants to be included in the survey administration need to be identified. For example, if a researcher desires to administer a survey to a group of bilingual children, a survey questionnaire might be inappropriate if the children have a difficult time in understanding vocabulary or if their reading level is not proficient. In this case, although a survey might initially seem to be the most effective means, the researcher could decide to conduct interviews with the children rather than obtain information through a questionnaire. Also, administering a questionnaire to a target population when the subjects have little knowledge about the topic might be futile. For example, if a graduate student is seeking to assess an educational program and decides to administer a questionnaire to all the teachers, this process will likely be ineffective if the teachers are unfamiliar with the educational program. Upon analyzing the results, the graduate student might find that most of the questionnaires were returned without being completed. Therefore, understanding the target population and ensuring that the participants have the proficiency and knowledge to answer the items on the questionnaire are basic to all survey administration.

Another example of administering a survey without completely understanding the target population involves the situation of an education consultant desiring to improve teacher morale problems within a school district. The consultant might administer an organizational survey to all the teachers to assess their opinions about the school, only to find that the majority of teachers strongly agreed to all the statements. The consultant might later discover that the superintendent's office wanted to remove the principal, and most of the teachers were supporting the principal by rating every statement very high so that the overall results of the survey would appear very favorable to the principal. Therefore, in this situation, obviously, the administration of the survey was ineffective, given the politics within the school district.

Step three consists of ensuring that there is *commitment* to conduct the survey. For example, a researcher might feel that a survey is the

most appropriate intervention for collecting data but that the resources are inadequate to administer it. For example, if a consultant is interested in administering a survey to assess teacher professional development needs, she must first talk to the administration to ensure that the resources are adequate, such as: people to administer the survey, money for making copies of the questionnaire and postage, time for teachers to complete the questionnaire, computer equipment and software to complete the analysis of the data, and time for the teachers to hear the results of the survey and participate in developing action plans to address the issues. For example, it is unrealistic to administer a survey if the teachers are too busy with more important activities—teachers might be too busy at the start of the school year and too stressed at the end of the school year to give meaningful and unbiased opinions. Also, if the teachers are too busy or have higher priorities, a low turnout might result in the survey being compromised. Therefore, in establishing commitment, the researcher must consider all time frames, logistics, allocation of resources, and realistic goals and deadlines for the survey administration.

The *design of the questionnaire* (step four) can be the trickiest part of the whole survey process. If the researcher doesn't develop a quality questionnaire, the result of the survey will be poor. The actual questionnaire, sometimes called the *instrument,* can be designed by using some basic guidelines (see fig. 3.19).

Two types of questions can be used for the questionnaire: closed-ended questions and open-ended questions. Closed-ended questions are similar to multiple choice questions, which allow the respondent to select or rate a numerical value for the question. The answers to the

▶ Use common language; avoid jargon
▶ Keep the questionnaire short, but without losing substance
▶ Select the best scale for rating items
▶ Include specific, thorough directions
▶ Number each of the pages and statements
▶ Develop an attractive questionnaire format
▶ Don't mix positive and negative statements, which can confuse respondents
▶ Avoid leading questions that cause the respondents to answer in a preferred way
▶ Avoid repetitive statement
▶ Include specific instructions for returning the questionnaire

Figure 3.19.   Guidelines in Designing Questionnaires

Forced Choice Learning

Directions: Circle the number that represents the extent to your agreement or disagreement for each of the questions:

▶   Problem-based learning improves my understanding of science.
    Extent of agreement (circle one)

    1.   Strongly agree
    2.   Agree
    3.   Disagree
    4.   Strongly disagree

Figure 3.20.   Example of Closed-ended Questions and Scales for Questionnaires

questions typically measure the respondent's attitude, knowledge, or opinion. Many different types of scales can be used for closed-ended questions. Selecting the best scale is crucial for allowing the respondent to easily answer each of the questions and the researcher to later analyze the data. For example, if the researcher desires the respondent to make a forced decision among items that are similar, he or she might want to use the *forced ranking scale* (see fig. 3.20). A forced ranking scale can ensure that the respondent is forced into making a decision among several items.

In some instances, a simple *yes-no scale* is the most effective and least confusing. These scales offer a quick and easy method for the participants in answering questions (see fig. 3.21).

Another type of questionnaire scale is the *graphic ratings scale*. This scale can be useful when a wide degree of assessment is desired. This scale is especially useful when rating similar items (see fig. 3.22).

Of the many types of scales, the *Likert scale*, named after Rensis Likert, is one of the more popular scales and uses a five-point scale ranging from "strongly agree" to "strongly disagree" (see fig. 3.23).

Directions: Circle the answer that indicates your opinion regarding the following statement:

▶ I enjoy reading at home in my spare time.
   1. Yes
   2. No

▶ I enjoy my reading assignments.
   1. Yes
   2. No

Figure 3.21.   Example of Yes–No Responses

Directions: Please mark an "x" on the line which indicates your opinion about your teacher's effectiveness.

		1	2	3	4	5	6	7	8	9
▶	Giving Instructions	Very effective								Very Ineffective

		1	2	3	4	5	6	7	8	9
▶	Answering student questions	Very effective								Very Ineffective

		1	2	3	4	5	6	7	8	9
▶	Explaining homework	Very effective								Very Ineffective
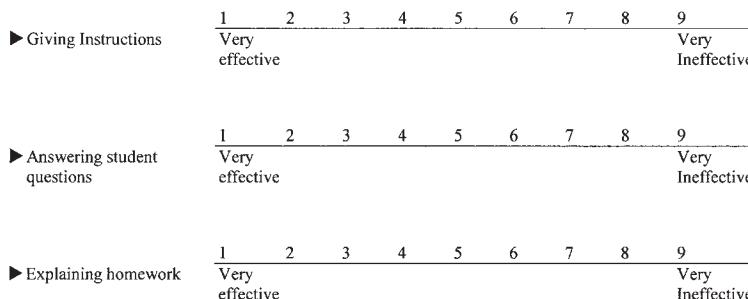
Figure 3.22.   Graphic Ratings Scale for Assessing Teacher Effectiveness

The five-point scale is most common, but there are many other types and categories of scales (see fig. 3.24).

One of the more challenging questionnaires to design is when working with people with limited reading or comprehension ability, such as special education or early childhood students. It might be difficult for students with special needs or young children to completely understand the statements or scale. Therefore, one practical scale is the *facial picto-*

Directions: Please indicate your extent of agreement for each of the items by circling the number:

		1	2	3	4	5
▶	I believe students feel safe and secure at school	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

		1	2	3	4	5
▶	I believe morale is high with students	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
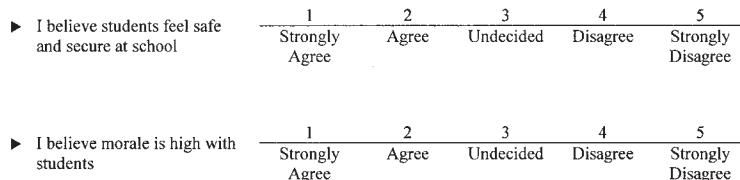
Rank Order Scale

Directions: Please rank the four subjects based upon how valuable they are in life.

	1	2	3	4	5
	Most Important				Least Important

▶ Mathematics   _____
▶ Reading   _____
▶ Science   _____
▶ Spelling   _____
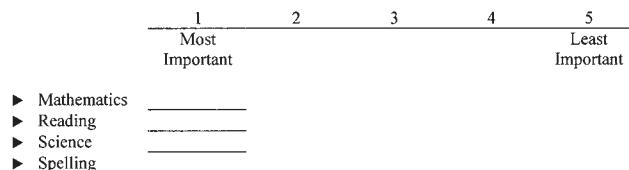
Figure 3.23.   Examples of a Likert Questionnaire Scale

Category 1	Category 2	Category 3	Category 4
Strongly disagree	Very favorable	Strongly approve	Very frequently
Disagree	Favorable	Approve	Frequently
Undecided	Neither favorable or	Neither approve or	Sometimes
Agree	unfavorable	disapprove	Almost never
Strongly agree	Unfavorable	Disapprove	
	Very unfavorable	Strongly disapprove	

Figure 3.24. Categories of Scales

rial scale (see fig. 3.25). When using the facial pictorial scale, it may be necessary to read the questions and ask the students to point to each of the faces representing each of their responses.

A combination of different scales can be useful in surveys. For example, a combination of a categorical scale with an open-ended forced ranking can be useful in allowing the respondents to make thorough analysis of their ratings by completing this two-stage approach (see fig. 3.26).

In the first stage, the categorical rating scale, the participants rate the factors, depending upon their extent of agreement for each item. For example, if the participants are rating the importance of the different topics for their personal development, this scale allows the respondents to rate each of the factors. After the respondents have rated each of the factors, then they complete the second stage by force ranking which of the top five factors would be most useful for their professional development. In this way, the researcher obtains two sets of data with which to analyze and make conclusions. The second set of data, the forced ranking factors, would probably receive

Directions: Please point to the face that represents your feelings towards each of the questions.

▶   I like to read
▶   I like my teacher
▶   I like my classmates
▶   I like my school books
▶   I like my school
▶   I like my principal
▶   I like my classroom

Figure 3.25.   Example of a Facial Pictorial Scale

Directions: The purpose of this assessment is to assist Human Resources in selecting the most appropriate professional development topics. Please assign a number from one to seven for each of the topic indicating the degree of need for your further professional development.

1	2	3	4	5	6	7
Least Important			Average Importance			Most Important

_____ Managing stress   _____ Developing instructional skills
_____ Planning and organizing _____ Understanding learning style
_____ Time management   _____ Understanding curriculum methods
_____ Improving attendance   _____ Building students' self-esteem
_____ Managing discipline   _____ Motivating students
_____ Counseling students   _____ Improving student study habits
_____ Managing conflict   _____ Understanding diversity
_____ Teaching challenging students _____ Understanding character education

Directions: Please rank order from the above or other topics, the five topics most needed for your professional development (1 is most important).

1 _____
2 _____
3 _____
4 _____
5 _____

Figure 3.26.   Sample Professional Development Questionnaire Using a Two-stage Scale (Categorical Scale and Forced Ranking Scale)

more importance given that it was based upon previous analysis by the respondent (see fig. 3.26).

There is an old saying that when a person is trying to secure employment, the purpose of the resume is to get the interview. Likewise, in survey administration, the purpose of the *cover letter* (stage five) is to get the respondent to complete the questionnaire. Therefore, in both cases, each one needs to be written in a manner to accomplish the objective. Although the letter should be succinct, it should also contain all the necessary information the respondents need to accurately complete the questionnaire (see fig. 3.27).

Most cover letters should explain exactly the purpose of the study, what will happen to the data, and if the respondent will remain anonymous. The researcher needs also to be concerned with any sensitive areas or politics in completing the questionnaire. For example, a consultant was once asked to administer a school survey to all the teachers in a district office because there were several disgruntled teachers who disapproved of the principal's performance. Therefore, a discussion with the consultant, principal, and district superintendent was held to determine who

▶ Is the purpose of questionnaire stated?
▶ Is the importance of study emphasized?
▶ Is the study anonymous?
▶ Will the data be confidential?
▶ Does an informed consent form need to be enclosed?
▶ Does the study need to be described?
▶ Is the study voluntary?
▶ Will the respondents get a copy of the results?
▶ What is the time table for the study?
▶ Did you thank the respondents?

Figure 3.27.   Questions to Consider in Designing a Cover Letter

should sign the cover letter in announcing the survey. If only the principal signed the letter, then many of the teachers would think that the survey process was biased toward the principal, and the teachers would not trust the process. If only the consultant signed the cover letter, the importance of the entire survey would not be valued by the teachers if the school administration was not involved. Also, if only the superintendent signed the cover letter, then teachers might also feel apprehensive given the principal was not involved or an unbiased third-party consultant. In this particular case, it was decided that all three people, the principal, the consultant, and the superintendent would draft a letter together and sign it so that the teachers would understand that everyone was involved in this process. Therefore, before administering a survey, the researcher should explore all potential concerns and issues in drafting the letter as well as the questionnaire to ensure that the respondents will complete the questionnaire with candidness and honesty (see fig. 3.28).

Some researchers have developed creative techniques for designing cover letters to increase the rate of return. For example, some people enclose a small cash incentive or promise a gift for completing the questionnaire. Generally, if a cash reward is enclosed, such as a few dollars, it should be clear that the money is being offered as a token of appreciation rather than for the respondent's performance in completing the survey. This will help ensure that the survey process is unbiased. The researcher should also include a date by which the questionnaire needs to be returned; otherwise, people may procrastinate if a date is not given. The researcher should always include a stamped, self-addressed

Dear Teachers and Staff,

We are interested in obtaining your opinions regarding our school and would appreciate if you would complete the enclosed questionnaire and return it in the stamped, self-addressed envelope by May 15, 2010. The survey is being conducted by Dr. Smith, an independent consultant, who will complete the analysis and then conduct a feedback session for all teachers to explain the results of the survey. Based upon the results of the survey, I would like to establish quality teams to address the issues for our school.

The questionnaire is completely anonymous and voluntary. Your individual responses to the questionnaire will remain strictly confidential. Also, informed consent procedures for this study are contained in the questionnaire. Please take a moment to read it.

Thank you for your cooperation and participation in this process. I look forward to meeting with you during the feedback session.

Sincerely,
 Mr. Jones

Mr. Jones
Principal

Enclosure

Figure 3.28.   Example of a Cover Letter

envelope; otherwise, the rate of return will be decreased. The use of survey administration in action research probably has a higher rate of return than other types of research given that the respondents generally have a vested interest in solving educational problems and making improvements. The respondents are often individuals who desire to complete a questionnaire and be involved in developing action plans to address the issues. However, if the respondents feel that the survey is just another feeble attempt to gather information and that little will be done, their motivation will be low in completing the questionnaire. Therefore, when possible, the administration and other influential people should sign the letter, which will increase the rate of return.

A common mistake of researchers is their failure to properly *pilot the questionnaire* before administering it (step six). Researchers should always pilot the questionnaire by pretesting it with a group of similar respondents. The researcher might conduct a focus group, read each statement aloud, and ask the respondents the meaning of each statement and if each statement drives the intentions of the researcher. This process will help to establish the validity and reliability of the statements and allow the researcher to revise the statements as necessary. Another method is to try two versions of the questionnaire on two different subgroups and then make a comparison. When discussing each

of the questions with the focus group, the researcher should pay close attention to the wording of the statements to avoid biased or insensitive words. For example, if the researcher administering the survey asks the respondents if they feel they can trust people who have a beard and if the researcher has a beard, then obviously the responses will be biased. Likewise, certain words are offensive, insensitive, or discriminatory against certain classes of people. These words can be biased in terms of gender, age, ethnicity, race, sexual orientation, or disability. For example, if a researcher is asking a group of female faculty to answer a questionnaire regarding faculty development and one of the statements refers to women as "girls" or "ladies," the respondents might be offended by the use of these potentially "sexist" terms, and the results of the survey will be diminished. Also, for example, the way in which some statements are worded can have a positive or negative impact on the responses. For example, a positively worded statement might be "Do you feel we should provide funding for the poor?" versus "Do you feel we should spend more taxes for welfare?" The first question might generate a more favorable response than the latter.

In some situations, the researcher might want to *announce the administration of the survey* prior to actually distributing it (step seven). For example, if a principal is using a consultant to administer a school survey for all the teachers, he or she might want to announce the survey a week in advance so that teachers can be prepared to allocate time to complete the survey and understand its importance. The teachers also might need time to ask questions concerning the process prior to completing it. In other cases, when a teacher is administering a survey to a class of students, he or she might need to receive a signed consent form from their parents. In some cases, it is not necessary to announce the survey, such as in a department meeting where a small group of teachers will complete a survey for the department chairperson. In this situation, the chairperson could simply explain the purpose of the survey and then ask the teachers to complete it during the meeting, especially if it is a short questionnaire.

Step eight consists of *administering the survey*. The toughest part of administering the survey is when the group of participants is large. When the group is small, such as a class of students, then the sample population is considered self-contained, and the researcher can easily

administer the survey at one time and immediately collect the question-naires. Difficulty can arise when the participants are not at one location, and the researcher needs to mail the questionnaires. The use of mailed questionnaires always has a significantly lower rate of return than when the questionnaires are administered to one group in person. Likewise, when a questionnaire is used via the Internet, the rate of return can be lower even if follow-up through e-mail is convenient. The best method of administering a questionnaire, when possible, is to administer the questionnaire in person to the group of participants. In this way, the researcher can explain the purpose of the study, give instructions in completing the questionnaire, and answer any questions. He or she can then allow a predetermined time for completing the questionnaire and then immediately pick up all the questionnaires.

When there is a significantly large group of people, then the re-searcher could obtain assistants to help administer the questionnaires. For example, a consultant once administered a questionnaire to 2,000 parents whose children attended one large school. Rather than mail the questionnaires to all 2,000 parents, given that the rate of return would most likely be low, the researcher decided to use the students as a vehicle in administering the survey to their parents. The researcher met with all the teachers from the school and instructed the teachers to clearly explain to the students how their parents should complete the questionnaires. In this case, the survey process was called a *two-day survey turnaround*. All the teachers distributed the questionnaires to the students, and the students were told to ask their parents to complete the questionnaire without delay so that they could return the questionnaires by the next day. Two days were allowed to complete this process, which was found to be efficient, rather than giving parents a greater length of time. The researcher also allowed an additional one week to complete the survey for any parents who were out of town or had extenuating circumstances. Teachers were also instructed to keep a list of all the students whose parents returned the questionnaires so that the researcher would know how many people and from which classes questionnaires were completed and to have a checks-and-balances system to ensure a credible process.

Undoubtedly, every researcher is faced with *nonrespondents*, partici-pants who do not complete the survey (step nine). Extenuating situa-

tions often occur to prevent a participant from responding in a timely fashion. For example, participants might be absent, on vacation, or preoccupied with other activities, and the researcher needs to follow up with these people. It is important to allow a reasonable amount of time to follow up with nonrespondents to obtain the highest rate of return. The researcher needs to make a professional judgment, if the rate of return appears to be too low, whether to continue the study. Given that every situation that impacts the rate of return is different, it might be necessary to have a total of three or four follow-up survey administrations in order to obtain an acceptable return. The researcher needs to develop a follow-up letter that will be different from the initial cover letter. The follow-up letter contains similar information but is worded differently in order to produce a better return. If the same letter is sent, the respondents might still fail to complete the questionnaire. The follow-up letter could have more personal appeal or attractiveness than the initial letter in order to achieve higher effectiveness. In some cases, if the researcher knows the respondents, he or she could call them personally in order to encourage them to participate in the process. Also, the use of postcards and e-mail can be a helpful reminder in improving the rate of return.

Another important concern for the researcher is administering a survey to participants when the group is too small. For example, a consultant might be administering a survey to all the teachers within a school, and the analysis might be calculated based upon departments; if a department has a small number of teachers, anonymity will be compromised. One general rule in conducting organizational surveys is that a department should have at least five members in order to ensure a minimum degree of anonymity. Otherwise, if the group is too small, the group might need to be combined with another group.

Step ten consists of *analyzing the data* from the questionnaires. Although methods to analyze data are covered in a later chapter, special features can be employed in designing and administering the questionnaire that will make later analysis easier. The survey in figure 3.29 is a typical organizational survey in which teachers are asked to give their opinions regarding their school. The survey is broken down into three groups according to grade level. The statements have been designed to reflect the organizational issues in the school. A five-point Likert scale

Name of School:_____

Directions: Please indicate your group; then answer the following questions.

Group #1: Grades 1–3   Group #2: Grades 4–5   Group #3: Grades 6–7

To what extent do you agree or disagree with the each statement?

1. School policies such as discipline and attendance are clearly stated and are fair.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

2. School policies and procedures are administered fairly and consistently enforced.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

3. I believe we are kept well informed on matters that affect us.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

4. Teachers' concerns are listened to and acted upon by administration.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

5. I believe students feel safe and are respected.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

6. Our school climate promotes student self-esteem and involvement.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

7. Teachers utilize effective instructional techniques.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

8. Teachers utilize adequate instructional resources.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

9. I feel the curriculum at our school is effective.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

10. I believe students are receiving a quality education at our school.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

11. I believe morale is high among teachers at our school.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

12. I believe interpersonal relations among the teachers are good.

1	2	3	4	5
Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

13. There is good parent and community involvement at our school.	1 Strongly Agree	2 Agree	3 Undecided	4 Disagree	5 Strongly Disagree

14. I believe the parents and community respect and support our school.	1 Strongly Agree	2 Agree	3 Undecided	4 Disagree	5 Strongly Disagree

15. I believe that teachers carry their fair share of the workload.	1 Strongly Agree	2 Agree	3 Undecided	4 Disagree	5 Strongly Disagree

16. Teachers are willing to volunteer for extra responsibility beyond their regular duties.	1 Strongly Agree	2 Agree	3 Undecided	4 Disagree	5 Strongly Disagree

17. Our facilities are in good condition and are well maintained.	1 Strongly Agree	2 Agree	3 Undecided	4 Disagree	5 Strongly Disagree

18. Teachers freely give assistance to each other in getting work done.	1 Strongly Agree	2 Agree	3 Undecided	4 Disagree	5 Strongly Disagree

19. Faculty meetings are sufficient and regularly held.	1 Strongly Agree	2 Agree	3 Undecided	4 Disagree	5 Strongly Disagree

20. The bussing operates efficiently at our school	1 Strongly Agree	2 Agree	3 Undecided	4 Disagree	5 Strongly Disagree

Figure 3.29. Organizational Survey

is used to ask the participants their extent of agreement with each statement.

The statements in this organizational survey have also been categorized by dimensions (see fig. 3.30). For example, the first two statements refer to the topic of policies. Therefore, dimension number one is labeled "policies." The third and fourth questions pertain to the topic of communications. The fifth and sixth questions pertain to "student-centered learning." The other dimensions are instruction and resources, curriculum, organizational climate, and so forth.

Constructing the survey in this manner will assist the researcher when he or she completes an analysis of the results. In analyzing the results,

Dimension		Correlating Survey Questions
Dimension #1:	Policies	Questions #1–2
Dimension #2:	Communications	Questions #3–4
Dimension #3:	Student-centered learning	Questions #5–6
Dimension #4:	Instruction and resources	Questions #6–8
Dimension #5:	Curriculum	Questions #9–10
Dimension #6:	Organizational climate	Questions #11–12
Dimension #7:	Parent and community involvement	Questions #13–14
Dimension #8:	Work performance	Questions #15–16
Dimension #9:	Miscellaneous	Questions #17–20

Figure 3.30. Dimensions of the Organizational Survey

the researcher will be able to form an opinion regarding each of these dimensions, based the respondents' degree of favorableness to each of these statements. Also, organizational surveys generally contain open-ended questions at the end of the questionnaire (see fig. 3.31). These questions can help the action researcher gain additional information about the organization.

Step eleven consists of *conducting the feedback session*. Given that action research is a collaborative process that is concerned with solving educational problems and making school improvements, this step allows the participants to maintain involvement in the process. However, the feedback session is considered to be an optional step because it is possible that the participants do not need to be given the results. Generally, during the feedback session, the participants ask questions and learn about the results of the survey but do not actually develop action plans until a later time. The feedback session is considered an opportunity for clarification. It generally does not allow sufficient time to allow participants to develop an action plan.

In some instances, even in action research, a feedback session might not be sensible or practical. For example, if a teacher administers a survey to his or her students, it might not be necessary to inform the stu-

►   Please describe the things you like best about your school.
►   Please describe the things you like least about your school.
►   Please write ideas for making improvements at your school.

Figure 3.31. Examples of Open-ended Questions

dents of the results if the teacher feels that the results of the survey are too sensitive or simply not useful for them. In most cases, if a researcher asks respondents to participate in a survey, they should have a right to know the results. For example, if a principal administers an organizational survey to all of his or her teachers, then it would seem logical that the teachers would get a copy of the results and would be involved in the development of action plans to address the issues.

A general rule in conducting an organizational survey is that teachers should not be asked questions if the administrator does not intend to do anything about the issues. The researcher should also be careful not to raise false hopes or expectations, which will discourage them from participating in future surveys. Likewise, the same argument can be made concerning students in a classroom. If a teacher asks the students to complete a survey, then most likely, unless there is sensitive information, the results should be shared with the students.

The *development of action plans* to address the issues in a survey is step twelve. This step is covered in more detail in chapter 5. However, basic to the action research process is the development of action plans to address the issues and ultimately make school improvements. This process generally works best when done in a collaborative effort involving all participants. For example, if a survey was administered to parents of students, it might be wise to give the results of the survey to the parents and ask them to become part of the process of developing action plans.

The thirteenth step involves conducting an evaluation of the actions. This entails assessing the immediate results from the actions, such as increased test scores, improved teacher and student morale, higher attendance, increased motivation, and so forth. An evaluation can also be conducted on the process of the survey and what improvement might be made for the future should it be replicated.

The last step of the survey process involves *following up* (step fourteen). Several approaches are used to follow up on assessing the results of the actions. A survey can be re-administered to assess the effectiveness of the actions, or follow-up interviews can be conducted. For example, if an organizational survey was administered to all the teachers, the researcher could follow up with the teachers at a six-month interval by holding department meetings to openly discuss the effectiveness of

the survey process and the results of the actions that were implemented. Although the researcher might find it most useful to re-administer the same survey, sometimes the availability of resources, such as time and money, can prevent re-administering the survey.

Individual Surveys

Although the survey is generally administered to groups of people, there are special situations in which a survey can be administered to an individual. For example, if the principal is experiencing performance problems with a teacher, he or she could conduct a coaching session with the teacher using the action research process. If the teacher is having difficulty in managing discipline, the principal could begin the coaching session by identifying the problem and then collecting data by asking the teacher to complete a discipline styles inventory. By completing the survey instrument, the teacher can assess his or her discipline style, which can be used as a basis of discussion for developing actions to improve the teacher's performance. Through this diagnostic process, it might be identified that the teacher is using a discipline style that is too "supporting," and he or she might need to develop a more "assertive" disciplinary style. The results of using an individual survey, followed up with discussion of the responses and development of action plans, can be a viable process when working with an individual.

Another example of administering a survey to an individual is when a teacher is experiencing a student who is having difficulty listening to the teacher and to fellow classmates. The teacher, like the principal, could begin by identifying the listening problem and then collecting data by asking the student to complete a listening profile. In this instrument, the student rates his or her ability to listen, based on different factors, which can then be discussed by the teacher and student. Action plans can then be made to help address the issues.

Two-way Surveys

The definition of a two-way survey means that the questionnaire is administered to a group of respondents, an analysis is made, and the results are then reviewed with the respondents. The meeting is generally

called a *feedback session*, where the respondents gain clarification as to the results of their collective responses. A two-way survey is one of the more popular methods of action research because it allows the participants to take an active role in understanding the group's responses and developing action plans to address the issues. Unlike action research, many surveys do not allow for this two-way process to take place with the respondents. Quite often in survey research, data are gathered from the respondents, but they are never given the results of the survey nor are they actively involved in the study. This is one of the unique features of action research because it promotes active involvement of the participants in solving educational problems. Therefore, the design and administration of a survey, when used in action research, should generally be done using this two-way process.

In action research, surveys are designed with open-ended questions as well as closed-ended statements. The open-ended statements allow respondents to give their honest and candid responses in a narrative form (see fig. 3.31).

One-way Surveys

Although most surveys, when used in the action research process, are designed as a two-way process, the one-way survey is sometimes used. The one-way survey is administered to respondents, the data are collected and analyzed, and the respondents are never involved in actually obtaining the results of the survey or actively involved in developing action plans to address the issues. For example, the teacher might be interested in conducting an action research study in which he or she desires to assess the opinions of parents regarding student study habits. After the parents complete this one-way survey, the teacher analyzes responses and then, based on this information, develops action plans to improve the study habits of students without the parents ever obtaining the results of the survey. Although this approach is acceptable in action research, the researcher needs to make a decision whether a two-way process would be more beneficial or if the one-way process is more efficient. Regardless of whether the survey is a one-way or two-way process, the questionnaire could include both closed-ended and open-ended questions.

ASSESSING

Assessing is another technique used in collecting data in action research. Assessing involves the evaluation of individuals' work by examining tests, portfolios, records, and through the direct observation of individual and group skills and behaviors. Assessing student performance can be more practical than observing, interviewing, or surveying when the data exist or assessment provides more practical and richer information for the action research study.

Portfolios

The word "portfolio" is derived from the Latin term "portare," meaning leafs or sheets of paper. The *American Dictionary* describes a portfolio as "a portable case for holding loose sheets of paper, drawings, and the like." The portfolio has similar meaning for educators. The portfolio can be defined as a collection of a student's work, such as drawings, writings, papers, projects, personal reflections, and related materials that can be used to judge his or her performance. The portfolio can be developed by the student in collaboration with his or her teachers. The portfolio contents can be contained in a three-ring binder, box, or suitable container. The key for developing a portfolio should be based upon the criteria of performance.

The idea of the portfolio, as used in action research, allows the researcher the opportunity to assess the student's work, which can give valuable information in identifying problems in the student's performance and assisting in developing actions for improvements. Roger Farr and Bruce Tone (1994) describe several advantages for portfolio assessment, such as "they encourage and develop self-assessment, provide varied and broad perspectives, integrate reading and writing with thinking, and should be authentic" (p. 5). With this in mind, portfolios can provide a convenient method for the researcher in evaluating a student's work, especially over a long-term period. An advantage of using the portfolio versus tests for assessment in action research is that portfolios often give a better reflection of the student's overall performance. Examples of artifacts that can be contained in the student portfolio include: performance tests, papers, teacher observations, anecdotal notes,

► Contains student's interests and ideas
► Includes other teachers' observations and anecdotal notes
► Contains meeting notes from meetings with parents
► Contains self-reflection notes
► Includes student's attitude toward work
► Provides introspective materials
► Contains actual student drawings and other materials
► Contains comments from conferences
► Contains writings and actual projects
► Contains photographs, video and audio recordings of student work

Figure 3.32. Advantages of Portfolio Assessment

meetings with parents, personal student logs, and homework materials (see fig. 3.32).

For example, if a teacher is experiencing a problem with a student who has shown a sudden decrease in reading performance, the teacher could make an assessment of the student's portfolio to gain insight as to the possible root cause of the problem. By reading the portfolio, the teacher might identify that the student, through his or her self-reflections, has been experiencing increased conflict at home. Also, the researcher might identify through a teacher's checklist that the student has not been completing reading homework assignments. Based upon a review of these materials, the researcher might surmise from the increased conflict and lack of reading homework that the student's home environment could be causing the decrease in reading performance. A follow-up interview with the student might confirm the researcher's assessment of the portfolio in making a diagnosis for the problem. Farr and Tone (1994) support the benefit of using the portfolio as an assessment by stating, "That kind of analysis is surely a more dependable indicator than counting responses to multiple-choice test items. The portfolio collection should clearly indicate the questions you and the student can consider about why comprehension may have been limited" (p. 245).

Testing

Action research is more practical than qualitative and quantitative research designs mainly because it takes less time for data collection and

analysis. Most educators simply do not have the time to conduct extensive research. Likewise, testing is one of the more convenient methods of data collection. Because teachers commonly administer tests, it is convenient for them to analyze these data outside of the classroom. Testing is often a normal part of the teacher's job, and the use of this data-collection technique can be easily performed as long as it is appropriate for the given action research study. Figure 3.33 lists some types of tests that can be used in action research.

The use of *subject matter tests*, as a normal activity in teaching, is one of the more convenient methods of testing in action research. These tests, which are generally constructed by the teacher, can be used to assess student performance on such topics as reading, writing, mathematics, science, and language arts. For example, a teacher might use an intervention, such as a new reading technique, with the hopes of improving student reading comprehension. The teacher could then administer the regular test to the students and then compare the difference between the students' test performance as measured by the test for the students who participated in the new reading technique versus those students who were in the traditional reading program. Given that the teacher would be administering the test anyway, an examination of these tests would be an easy way to note if there are differences between the classes based upon the reading techniques.

Test: Subject matter tests
➥ *Definition:* Teacher-constructed tests that measure student performance on classroom activities.

Test: Achievement tests
➥ *Definition:* Standardized tests constructed by state or professional agencies.

Test: Aptitude tests
➥ *Definition:* Professional tests that are often used for predictive measures of students' intelligence or ability.

Test: Intelligence tests
➥ *Definition:* Professional tests administered to measure general intellectual abilities.

Test: Special tests
➥ *Definition:* Tests that measure personality, values, interests, and other diagnostic measures.

Figure 3.33.   Examples of Performances Tests

One concern with action research is the lack of validity and reliability of the tests. The term *validity* asks: "Does the test truly measure what it purports to measure?" *Reliability* refers to "the ability of the test to accurately measure consistently over time." Although the use of these tests might not have expert validity and reliability, they can still be useful in making assessments in action research. There are different kinds of validity, such as content validity, criterion validity, and construct validity. *Content validity* refers to the ability of a test to measure the subject of the content. For example, does a standardized test actually assess the items on the test? If changes have been made to the content (e.g., integrating technology into mathematics), the test may no longer be a valid indicator. Content validity is generally determined by experts in the content field. They make expert opinions if tests are valid. *Criterion validity* refers to the extent in which two tests correlate. For example, if a new or additional reading test is developed, does it assess reading performance as well as the previous test? Criterion validity can be used for assessing both concurrent and predictive validity. *Construct validity* refers to the ability of a test to actually assess some concept. Given that concepts are non-observable, it may be fundamentally tricky to actually measure the concept. For example, a test may have good content validity, but does it actually measure the construct? Concepts like self-esteem, motivation, and intelligence are sometimes difficult to access given the complexity of these abstract phenomena. Therefore, experts generally need to conduct a series of interventions to claim a basis for construct validity for a test.

Test reliability is generally established by a coefficient. A high coefficient indicates a high reliability, and a low coefficient indicates a low reliability. While there may be some variance between test taking, similar to basketball players shooting free throws, a similar score should be observed time after time. Therefore, reliability can help to establish the performance of a test over time (stability) but doesn't establish validity.

The use of *achievement tests* can also be a useful and efficient way to test students. Most school districts utilize some form of a state or professional standardized test to measure student performance. An examination of the results of these tests by students can give the teacher valuable information in collecting data on students. For example, if an

administrator is conducting an action research study in an attempt to measure the performance of an entire school, the use of standardized tests could help him or her in making this assessment.

Other methods available for student assessment by the action researcher are *aptitude tests* and other *special tests*. For example, if a teacher is attempting to conduct an action research study in improving the self-esteem of students, the use of a special test that measures self-esteem could be valuable in making this assessment. Teachers should be careful when conducting action research to ensure than no harm comes to any of the students, especially when using personality inventories. Use of these types of tests, such as Minnesota Multiphasic Personality Inventory (MMPI), and other personality diagnostic tests should only be administered by trained professionals. Some examples of typical achievement tests include the California Achievement Test, the Stanford Achievement Test, the Iowa Tests of Basic Skills, and the Metropolitan Achievement Test. Examples of other specialized tests include the California Psychological Inventory, Stanford-Benet Intelligence Scale, Wechsler Intelligence Scale, Strong-Campbell Interest Inventory, Work Values Inventory, School Attitude Assessment Survey, and the Tennessee Self-Concept Scale.

There are basically two types of standardized tests: norm-referenced instruments and criterion-referenced instruments. Norm-referenced tests compare a student's score against the scores of a known group, such as a district, state, or nation. These tests can be valuable in comparing students' scores with other students. Criterion-referenced tests measure a student's performance based upon a pre-established standard of performance as determined by experts. These tests are especially helpful is estimating a student's level of performance and identifying deficiencies based upon pre-established criteria. For example, a criterion-referenced test might indicate that a student "spelled nine of ten words correctly" or "correctly solved eight of ten math problems." A norm-referenced test, on the other hand, would indicate the student's score as compared to a known group (such as "scored in the 80th percentile nationwide" or "scored in the top 10 percent, as compared to students statewide"). Both types of tests can be useful in making assessments in action research.

Records

Action researchers should never overlook the possibility of using student records to help collect data. There are many sources for student records, such as the student's permanent file, past teacher records, disciplinary dean records, and records of counselors and other special services. These files contain valuable information in which the action researcher can gain insight in collecting data, such as the student's past attitudes, values, emotional and behavioral disorders, academic abilities, and past home environment characteristics. For example, a teacher might conduct an action research study to measure the impact of single-parent versus two-parent families on student behavior or achievement. The use of these records could provide a valuable source of data for the researcher.

Processing

Processing is a method of data collection that is especially useful for analyzing situations and learning environments. The objective of using processing techniques is to facilitate individual or group structured sessions to brainstorm causes of problems, which then serve as a basis for decision making. The use of processing techniques is an outgrowth from the *total quality management initiative* (TQM). TQM is a philosophy that embraces the idea of making continuous improvements to meet or exceed customer expectations. The concepts of TQM rely heavily upon the use of teamwork, problem-solving techniques, quality improvement, innovation and creativity, benchmarking, and customer satisfaction, which are all common elements of action research (Camp, 1989). Several processing techniques can be used in action research (see fig. 3.34).

The *team-building* session is a processing technique that can be helpful when a researcher desires to identify problems that affect an intact team. For example, a department chairperson who is experiencing problems within his or her department could assemble his or her staff and conduct a team-building session. In this session, the team members identify all the possible causes of problems that negatively affect the department's performance. Some of these possible causes include unclear

Processing Technique: Team Building
➡ *Definition:* A structured session where team members exchange ideas, and brainstorm causes for problems, and make action plans for improvement.

Processing Technique: Brainstorming
➡ *Definition:* A structured approach whereby individuals meet to collectively generate possible causes for problems and ideas for solutions.

Processing Technique: Storyboarding
➡ *Definition:* A problem-solving process whereby groups develop visual displays to diagram possible causes and solutions to problems.

Processing Technique: Cause-and-Effect Diagram
➡ *Definition:* To portray, using a fishbone diagram, potential causes and effects of a problem.

Processing Technique: Force-field Analysis
➡ *Definition:* The "field theory" technique used to identify the hindering and supporting elements of a problem, which can be used for change and decision making.

Figure 3.34.   Examples of Processing Techniques for Data Assessment

goals, role incongruity, poor leadership, poor accountability, inadequate resources, or poor time management. These issues are often generated by a facilitator who lists all the possible issues freely identified by the members of the team. The group would then, by consensus, prioritize the issues that are most in need of improvement. Action plans are then developed to address the issues.

The *brainstorming* technique is another processing technique that is similar to team building but does not require an intact team. Brainstorming involves the pre-generation of issues that cause problems. For example, a teacher could work with his or her colleagues in brainstorming a list of all the possible reasons for poor student achievement. During this free-wheeling session, no criticism is allowed. The teacher acts as a facilitator and records all of the ideas on a flip chart or chalkboard, and these are then later analyzed. Action plans are then made to address the issues.

The *storyboarding* technique is a processing technique that is useful in producing a visual picture of processes and procedures. This technique was originally credited to Walt Disney in the early 1900s when he pinned completed drawings in sequence on studio walls so that the production crew could better visualize the animated story. The process of storyboarding can be useful to the action researcher. For example, a

school administrator can identify a problem of excessive tardiness among the students. He or she could assemble a group of teachers to develop the sequence of activities as students progress to classes throughout the day (see fig. 3.35).

The storyboarding process begins with identifying the topic (e.g., excessive tardiness). Then, the entire sequence of events for the students' day is outlined using *headers*, such as: bus schedule, homeroom, first period, second period, and so forth. Underneath each header, the teachers, through use of cards which are pinned to a wall, list different situations which cause student tardiness for each event. When completed, the group can view the storyboard, identify problems, and then develop actions to address the issues.

The *cause-and-effect diagram* is a processing method that is especially useful in identifying technical problems. This technique, often called the *fishbone diagram*, provides a pictorial method of breaking down central problems in an understandable diagram. The objective of this fishbone diagram is to list the *effects* and *causes* of a problem that can then later be used to make decisions for improvement (see fig. 3.36). For example, an administrator could identify the effect as "poor student academic achievement." The administrator then could brainstorm with a group of teachers to identify the major categories of causes that may be contributing to the poor student achievement. These might consist of poor teaching, instructional methods, curriculum, and school climate. Each of these categories would represent the branches of the diagram (i.e., fishbone arrangement). The group would then brainstorm specific causes for each of the major categories. For example, under the category of "school culture," possible causes might include poor teacher morale, excessive discipline incidents, unsafe school, poor facilities, and presence of gangs. Under the category of "teaching," possible causes might include inexperienced teachers, apathy, low motivation, poor teaching skills, and poor placement of teachers. The category called "instruction" could include lack of innovative instruction, outdated instructional techniques, poor facilities for instruction, and inadequate instructional resources. The last major category, "curriculum," might include outdated instructional materials, poor curricular resources, inadequate resource guides, and insufficient curriculum. The number of major categories and their sub causes can vary, depending on the statement of the problem.

Bussing Schedule	Homeroom Period	1st period class	2nd period class	3rd period class	4th period class	lunch period	5th period class	6th period class	7th period class
problem issue	problem issue	problem issue	problem issue	problem issue	problem issue	problem issue	problem issue	problem issue	problem issue
problem issue #2	problem issue #2	problem issue #2	problem issue #2	problem issue #2	problem issue #2	problem issue #2	problem issue #2	problem issue #2	problem issue #2
problem issue #3	problem issue #3	problem issue #3	problem issue #3	problem issue #3	problem issue #3	problem issue #3	problem issue #3	problem issue #3	problem issue #3
problem issue #4	problem issue #4	problem issue #4	problem issue #4	problem issue #4	problem issue #4	problem issue #4	problem issue #4	problem issue #4	problem issue #4

Figure 3.35. Storyboarding Process
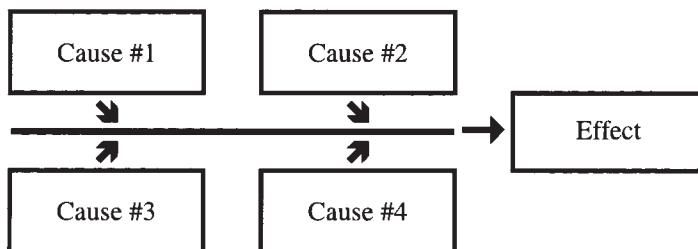
Figure 3.36.   Example of Cause-and-Effect Diagram

The *force-field analysis*, although not specifically designed as a problem-solving technique, can be an effective processing technique for collecting data. This technique, developed by Kurt Lewin (1947), was originally designed as a group process for initiating change. The process involves identifying the *driving forces* (factors that promote change) and *restraining forces* (factors that hinder change). The result of these counter forces creates a polarization that prevents change from occurring (see fig. 3.37).

Lewin stated that in order to create change, either the restraining forces must be reduced, the driving forces strengthened, or a combination of both. This technique can be useful for the action researcher in identifying the restraining forces (causes of problems) that hinder effective change. For example, if a teacher is conducting an action research study with the objective of improving reading skills, the force-field analysis technique could be used. The teacher could identify all
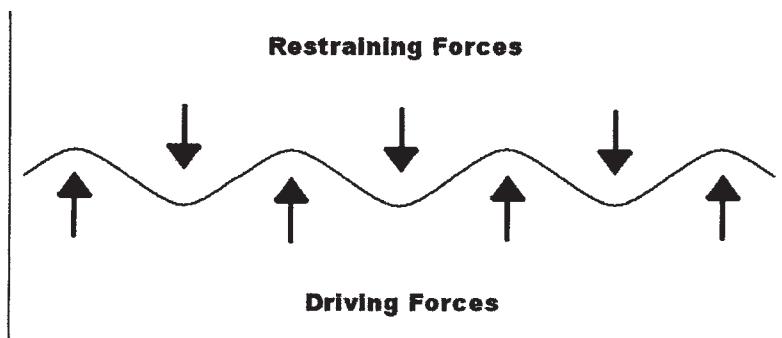
Figure 3.37.   The Force-field Analysis Technique

the restraining forces that are hindering effective reading achievement, such as poor reading material, lack of parental support, low student motivation, inadequate reading resources, and poor reading instructional techniques. The driving forces could also be identified, such as the need to improve test scores, state mandates for reading improvements, and school district board policies. The teacher could use this technique as either an individual or group problem-solving process.

Another useful strategy to assist in the action research process is *appreciative inquiry*. This strategy, which focuses on making organizational improvements rather than solving problems, centers on discovering what works well, brainstorming actions, planning and design, and implementing actions (Cooperrider & Whitney, 2005). The main focus of the researcher should be on identifying the positive actions that create improvements, to build upon these actions, and to apply these actions to other areas within the organization.

CHAPTER 3 EXERCISES AND DISCUSSION QUESTIONS

1. List and describe factors that hinder research observations.
2. List the degrees of observer participation.
3. List the steps in conducting an interview.
4. List examples of handling difficult interviewees.
5. List the steps in conducting a coaching session.
6. List and describe the steps in conducting a survey.
7. List examples of processing techniques for data assessment.
8. List and describe the four types of personality styles.
9. List and describe typical defense mechanisms used by people during an interview session.
10. List some guidelines when designing questionnaires.

4

DATA ANALYSIS AND INTERPRETATION

THREATS TO VALIDITY

Before an action researcher begins to analyze data, he or she must understand the terms *validity* and *threats to validity*. Validity refers to the extent to which the data is accurate and useful. For example, if an action researcher administers a survey to assess the opinions of students' knowledge of science, he or she needs to validate that the survey actually measures science content. In other words, does the survey actually accomplish what it is intended to measure? Therefore, any factors that negatively impact on the validity of the data can be called *threats to validity*. Guarding against threats to validity is especially important in quantitative research, given the need for preciseness, and is generally harder to control in action research. Campbell Stanley first established several threats to validity in 1963 (see fig. 4.1).

History

The concept of *history* can have a negative effect upon data collection. This concept refers to the fact that many factors can affect the nature of data if collected at different points in time. Few things in life

9 I

Threat: History
➥ *Working Definition:* Effects on data when collected at different points in time.

Threat: Maturation
➥ *Working Definition:* Physical, mental, or psychological development of people that affect the data collection.

Threat: Instrumentation
➥ *Working Definition:* The negative effects of the method used to collect data.

Threat: Attrition
➥ *Working Definition:* The loss of participants during the study (mortality).

Threat: Testing
➥ *Working Definition:* The negative effects of a pretest on data collection.

Threat: Differential Selection
➥ *Working Definition:* The negative effects of comparing dissimilar groups.

Threat: Hawthorne Effect
➥ *Working Definition:* Attention given to people that motivates them to perform better.

Threat: Researcher Bias
➥ *Working Definition:* The researcher's unconscious or conscious preference that affects the outcome of a study.

Threat: Contamination
➥ *Working Definition:* Any factors that negatively impact on the natural setting of the study.

Figure 4.1. Examples of Threats to Validity

remain constant. For example, if a researcher administers an attitude survey to teachers, he or she most likely will obtain different types of data, depending upon which point in time during the school year it is administered. If it is administered during midyear, the results will be different from results at year-end, just prior to summer vacation. Teachers are most likely to have more negative attitudes at the end of the school year than at midyear. Likewise, if an action researcher is collecting data over an extended period of time, the data could vary simply because changes occurred during this process. Any number of factors can affect the data, such as world events, economic crises, policy changes, and traumatic events. The action researcher should be careful to identify any factors that might impact the validity of the data and strive to obtain data under natural conditions.

Maturation

Maturation refers to the physical, mental, or psychological changes that occur in the participants. When researching elementary students, this factor is especially important because students in this age group are maturing at a quicker pace than in adulthood. For example, if a researcher is collecting data in an attempt to observe the impact of a new teaching strategy, the positive gains that are obtained might be explained by the fact that the students matured, not that the teaching strategy was more effective. In experimental research, the researcher would include a control group, which could help control for this effect because it is used in comparing the results between this control group and the treatment group. In action research, the researcher should try and control for maturation by also using a control group or observing any changes in development.

Instrumentation

The term *instrumentation* refers to the method by which data is collected (e.g., survey, observation, or interview). Therefore, the use of instrumentation, in itself, can impact the validity of the data being collected. For example, if a researcher is using the interview technique, it is possible that he or she might obtain more favorable responses simply because the respondent feels favorable toward the interviewer. Likewise, if the respondent feels unfavorable toward the interviewer, more negative responses might be obtained. The use of instrumentation might have a negative effect if the action researcher selects the wrong type of instrument for collecting data. It is possible that a researcher might, under certain situations, obtain more favorable responses during the interview process than if he or she were to use a questionnaire. Respondents are less likely to give critical opinions than if given complete anonymity through the use of a questionnaire.

Attrition

The term *attrition* refers to the loss of participants during the data-collection process. For example, if an action researcher is collecting data over an extended period of time and there are several student

absences, the data will be affected. The action researcher must always use common sense to ensure that there is a minimum loss of participants during data collection. For example, as an action research technique, the researcher administers a survey to a group of students. If, during the survey administration, several students are absent, the researcher needs to follow up with the absent students and obtain their responses to acquire maximum participation. Although there is no absolute rule for how many participants a researcher must have from a known sample population, the researcher must attempt to obtain as many as possible; otherwise, the researcher should not continue with the study.

Testing

A common practice in action research is for a researcher to administer a pretest, implement an action, then administer a posttest. If both the pretest and posttest are similar, the students might have learned enough from the pretest to show improvement on the posttest. This improvement might have nothing to do with the action administered but rather simply because the students became "test wise." To guard against this potential problem, an action researcher might eliminate the pretest, use different tests, or make sure a sufficient amount of time has elapsed before administering the posttest.

Differential Selection

The term *differential selection* refers to the fact that two groups can be dissimilar, and, therefore, the results can vary. For example, if a teacher administers action to one of two classes and then collects data on both classes for comparison, any differences can be explained because the two classes were different in the first place and not that the action was effective. In these types of cases, the action researcher needs to be sure that the two classes are similar in such characteristics as age, academic ability, gender, and behavior.

Hawthorne Effect

The *Hawthorne effect* refers to the fact that when people are given attention, such as through participation in an action research study,

they tend to be motivated to perform better. For example, if an action researcher is actually videotaping a group of students and they are aware of the recording, their behavior will probably be more positive than without the videotaping. Therefore, when conducting action research, the researcher must attempt to minimize the participants' awareness that they are participating in a study and attempt to maintain a natural environment.

Researcher Bias

The term *researcher bias* indicates the unconscious or conscious preference for a positive or negative outcome from the study. For example, if a researcher is administering an action and hopes that the result will be effective, he or she might tend to unconsciously slant the results more positively. Although this bias can be intentional or unintentional, the results negatively affect that quality of the data collected and the outcome. Therefore, the researcher must maintain high standards of ethics and integrity and always try to be neutral and objective when collecting data.

Contamination

The term *contamination* refers to any factors that negatively impact the natural setting or the actual collecting of data. Many factors might contaminate data collection, such as unexpected interruptions, use of video or audio recordings, poor instruments, or use of untrained researchers.

In experimental research, threats to validity are often controlled by using a control group to compare against a treatment group. In action research, a control group is not always used. Therefore, action research is more prone to experiencing threats to validity. The action researcher can try to control for threats to validity by recognizing them and trying to guard against them through observation and a little common sense. In medicine, a common saying is that medicine is "more art than science." This statement refers to the fact the physicians often need to use their best clinical judgment and common sense in treating patients versus always adhering to pre-established medical protocol. Likewise, action researchers must use their clinical ability and common sense to guard

against obvious threats to validity to ensure that the research is of the highest quality.

USING DESCRIPTIVE STATISTICS

The term *descriptive statistics* refers to the use of visual graphics, charts, diagrams, and basic mathematics to describe data. The use of descriptive statistics is the most common method of analyzing and displaying action research information. Other methods of statistical analysis, such as tests of significance, are seldom used with action research and are reserved for quantitative research.

Measures of Central Tendency

Central *central tendency*, a common analysis technique used in action research, is used to describe a set of data that is the "average" or "middle" score. This calculation is commonly used to compare the differences of the individual scores from the group. It is often called the "central point," around which data from the group are distributed. The three common measures of central tendency are the *mean*, *median*, and *mode* (see fig. 4.2). The mean is the arithmetic average of the scores. The median represents the middle score of a set of scores, and the mode represents the most frequent score of a set of scores.

For example, if a teacher distributes a test and desires to calculate the average of the scores, he or she often calculates the mean average as a representative midpoint. To calculate the mean, add the total scores, and divide this number by the number of scores. The median is commonly used to accurately depict a midpoint of a set of scores when the distribution of the scores is very low or high. The term *median* comes

Mean = 79	Median = 80	Mode = 90

| 40 | 50 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 90 | 100 | 110 | 115 |

Mean	**Median**	**Mode**
The arithmetic average of the scores	The middle score of the set of scores	The most frequent score of the set of scores

Figure 4.2.   Measures of Central Tendency for a Set of Data

from the Latin word "middle." The median is often used to report information, such as teacher salaries, family income, or the value of residential homes. The median would be more useful than using the mean because it often represents the numerical center of the set of data, especially when the scores significantly vary. For example, many small towns typically have people with average salaries but often include one millionaire. Calculating the mean would not adequately represent the income of the families in this small town. However, the median would better represent this numerical midpoint because it would take into account the extreme income of the millionaire.

To calculate the median score, simply arrange the scores in order, and then select the middle score from the group. Another method of calculating a median for ungrouped data is to add the total number of scores plus one and divide by two, which gives the numeric position. Then arrange the scores in order, and starting from the bottom, count each score until the numeric measure is obtained. This midpoint will be the median. If the position includes a half measure, then find the midpoint of the distance between the two whole numbers to indicate the median. For example, if the median is between 15 and 16, then the half median score is 15.5.

The mode is the most frequent score of a set of scores and is probably the least reliable of the measures of central tendency. In reality, the mode tends to represent the most common score, as opposed to a given midpoint of a set of scores. Although it has limited value, it does allow a researcher to identify a common score from a group, which can give insight in making interpretations. For example, if most students on a test incorrectly answered a particular test item (i.e., the most frequently missed question), the teacher could then examine this test item for the possibility of it being a poor question. The teacher then might, upon examination, revise the question.

It is important that the action researcher select the best measure of tendency when making analysis and interpretation. Likewise, the action researcher must use common sense in realizing that central tendency measurement is a form of statistics and that sometimes no measure of central tendency will adequately describe a set of data. For example, consider a situation in which five cars are sitting in a parking lot. The first two cars are total junk and have a total value of $50 each. The third

car is an old, beat-up vehicle with several mechanical problems and has a total value of $1,000. The fourth car is an economy car and has a total value of $10,000. The last car is a custom-made, high-performance, experimental vehicle and has a value of $3 million. Which measure of central tendency might a researcher use to describe this set of data (i.e., the five cars in the parking lot)? If we were to select the mode, the answer would be $50. This, however, does little justice in describing the five cars, especially the fifth car. If we were to use the median, the answer would be $1,000. Although this adequately represents the third vehicle, it does little justice for the first two or last two cars. If we were to calculate the mean average, the answer would be $3,011,100 divided by five, which equals $602,220. This figure certainly does little justice for describing the first four vehicles, and certainly significantly underestimates the fifth vehicle. Therefore, this example illustrates that no measure of central tendency adequately represents this set of data because the scores have such extreme variance.

Measures of Variability

Although it is not important for the action researcher to understand inferential statistics, having a basic understanding of *measures of variability* can help the researcher when interpreting data. The measure of variability indicates a statistic that can describe the dispersion, or spread, of the scores. It is different from a measure of central tendency because, rather than representing a midpoint or an average score, it describes a measure of distance, relative to the set of scores. A use of a measure of variation is typically associated with distribution of data that forms a normal curve (see fig. 4.3). Several terms are used to describe the normal curve, such as the bell-shaped curve, symmetrical curve, and the empirical curve. Some of the terms used to interpret the normal curve are: *the range*, *variance*, and *standard deviation*. The range represents the difference from the lowest to the highest score in the group. It is the measure of least reliability because its value can be affected by a single score that could extend significantly the low or high end of the distribution. However, the range is still a good crude measure of checking the distribution of the scores.

Range of Scores

Frequency of Scores

Standard Deviation	-3	-2	-1	Mean	+1	+2	+3
Percentiles	0.13	2.28	15.87	50	84.13	97.72	99.87
Raw Score	70	80	90	100	110	120	130
Stanine Score	1	2	3/4	5	6/7	8	9
Z Score	-3	-2	-1	0	+1	+2	+3
T Score	20	30	40	50	60	70	80
IQ Scale	55	70	85	100	115	130	145
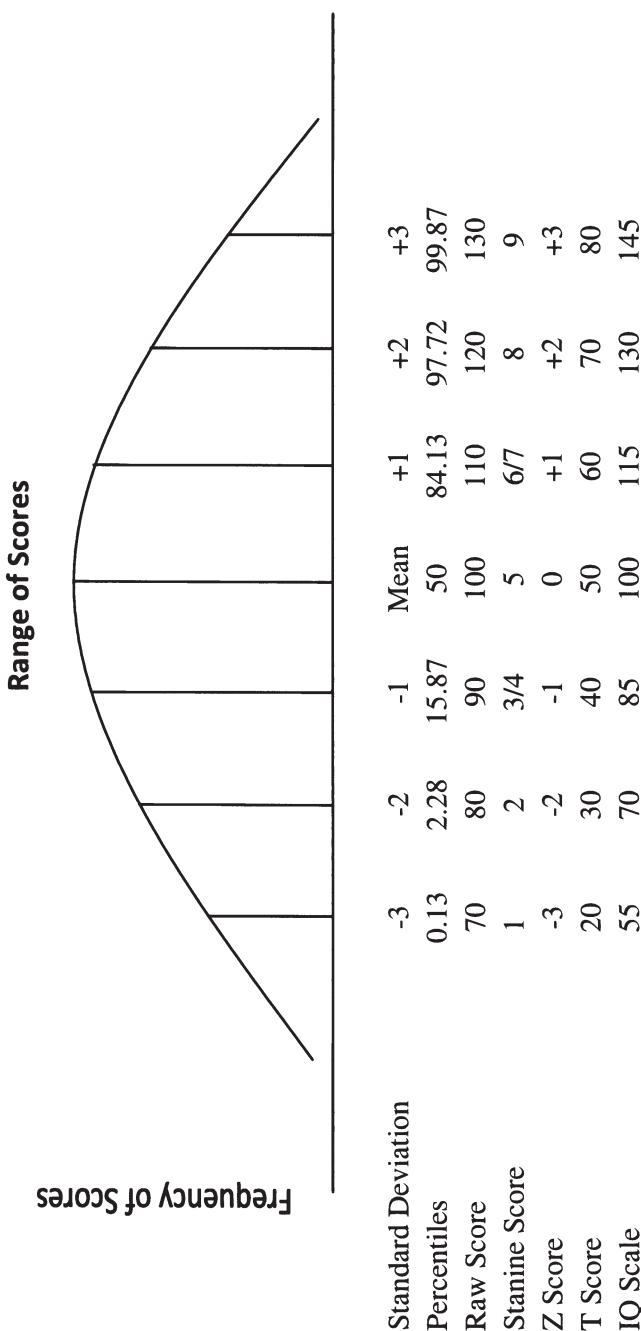
Figure 4.3.   The Normal Curve and Distribution of Data

The term *variance* refers to the measure of dispersion of the scores from the measure of central tendency (e.g., mean average). This *measure of variability* can be useful in helping to describe how much variance the scores have in relation to the average score. *Standard deviation* is the way of measuring the dispersion of the scores (i.e., variance). In the normal curve, approximately 68 percent of the scores will be contained in the area between plus one and minus one standard deviation from the mean. Approximately 95 percent of the scores will be contained in between plus and minus two standard deviations, and more than 99 percent will be included between plus and minus three standard deviations from the mean (see fig. 4.3). For example, if a group of student raw scores were plotted on the normal curve, it might represent a range from 70–130. The score of 70 would indicate the lowest performing student, and the score of 130 would represent the highest performing student. The mean average of all the students would be 100. Therefore, using the normal curve, approximately 68 percent of scores would be between 90 and 110. Ninety-five percent of scores would exist between 80 and 120, and more than 99 percent of the scores would be contained between 70 and 130. Therefore, the use of standard deviation can be a valuable measure in portraying the distance of the scores away from the average score. Although the action researcher might not always find it necessary to calculate the standard deviation for a set of scores, he or she can use existing data in which the standard deviation is given, and having an understanding of this statistic can be useful in making interpretations.

The normal curve represents a distribution in which the mean, median, and mode are equal to each other. Therefore, the normal curve is perfectly symmetrical because both sides of the curve from the mean are identical. If a set of data does not form a symmetrical curve, and the two sides are unequal, the distribution is referred to as a *skewed distribution*. A skewed distribution indicates that the median and mean are different from each other and that the distribution is unequal. For example, if a teacher gave a very difficult test to a group of students and only a few performed well, the distribution would lack symmetry and would represent a *negative skew* (negative skew = mean < median < mode). Likewise, if the teacher administered a test that was too easy,

and most of the students scored high, the distribution would show a *positive skew* (positive skew = mean > median > mode).

One of the more common uses of the normal curve and variability for the action researcher is interpreting state, national, and standardized tests. Teachers, when conducting action research, often rely upon state and national tests to extract data and make analyses. These tests generally include measures of central tendency and variability. Therefore, the need to understand these terms is important for the action researcher in making analyses and conclusions. For example, most standardized tests report the percentiles and other standard scores, which are represented by stanines, Z scores, and T scores. These standard scores are used so that students' performance on tests can be interpreted nationwide. For example, the *stanine score* includes the numbers from one through nine, with five being the average. A stanine of five represents the fifty percentile of a set of scores in a distribution. If a student were to score in the stanine of nine, this would indicate that the student has scored exceptionally high, in the very top end of the distribution (i.e., commonly called the *tail*). Likewise, if a student scored with a stanine of one, this would indicate that the student performed very poorly, and is in the lowest percentile of the distribution.

Consider an action research study in which the use of variability and measures of central tendency can be applied. For example, an action researcher conducts an organizational survey of all the teachers at a school in an effort to identify problems so that improvements can be later made. Assume that the first three questions of the survey are:

1. The school climate promotes student self-esteem.
2. Our concerns are listened to and acted upon by administration.
3. School policies are clearly stated.

If the survey questionnaire included a standard Likert scale in which the respondents indicate their extent of agreement by circling a value between one and five (strongly agree, agree, undecided, disagree, and strongly disagree), after the survey has been administered, the action researcher would need to tally the responses. Descriptive statistics could be used to make this analysis. The action researcher could calculate the

mean, standard deviation, and frequency for each of the responses to each of the items on the questionnaire (see fig. 4.4).

Figure 4.4 illustrates a sample of this analysis. For example, question number one, which pertains to the extent of agreement for student self-esteem, indicates that the mean is 2.79, standard deviation is 1.13, and the total cumulative percentage for the respondents who agreed with the question is 46.88. A total of 35 respondents answered this question. Of the 35 teachers, only 17 responded favorably (46.88 percent). As an action researcher, this would be cause for concern. The action researcher would then make an analysis that fewer than half of the teachers were positive toward their school in providing a climate that promotes student self-esteem. Therefore, the action researcher would need to further investigate this question by talking with the teachers and gaining clarification to this problem.

Likewise, the second question indicates that only 35.29 percent of the teachers feel that their concerns are listened to and acted upon (mean equals 3.15). Given that fewer than half the teachers feel positive toward this item, the action researcher would also want to gain further clarification on this item. The third question indicates that more than 38.24 percent of the teachers are "undecided" regarding whether school policies are clearly stated. Moreover, only about 26.47 percent of the teachers were positive toward this item. In this case, the action researcher might identify this item as a concern and gain further information about the issue.

As a rule, when interpreting data, an action researcher would identify an area in need of improvement as any item that the majority of respondents (e.g., approximately two-thirds of the respondents) did not rate positively. If an item were to be positively viewed by the majority of respondents (e.g., two-thirds of the participants or more), then the action researcher would indicate that this item is a strength. Although there is no absolute standard by which the action researcher makes his or her conclusions as to which items are considered a strength (i.e., positive item) or weakness (i.e., area of concern), a general guideline states that if more than 50 percent disagree or strongly disagree with an item, the issue should be identified as a concern.

A common method of collecting data and making an analysis is through the use of observation. For example, a teacher could conduct

Variable: Q1, The School Climate Promotes Student Self-esteem

Mean = 2.79   SD = 1.13

	Value	Frequency	Cumulative Frequency	Percent	Cumulative Percent
Strongly Agree	1	2	2	6.25	6.25
Agree	2	13	15	40.63	46.88
Undecided	3	10	25	31.25	78.13
Disagree	4	5	30	15.63	93.75
Strongly Disagree	5	2	32	6.25	100.00

Variable: Q2, Concerns Are Listened To And Acted Upon By Administration

Mean = 3.15   SD = 1.27

	Value	Frequency	Cumulative Frequency	Percent	Cumulative Percent
Strongly Agree	1	2	2	5.88	5.88
Agree	2	10	12	29.41	35.29
Undecided	3	6	18	17.65	52.94
Disagree	4	9	27	26.47	79.41
Strongly Disagree	5	7	34	20.59	100.00

Variable: Q3, School Policies Are Clearly Stated

Mean = 3.09   SD = 1.09

	Value	Frequency	Cumulative Frequency	Percent	Cumulative Percent
Strongly Agree	1	4	4	11.75	11.76
Agree	2	5	9	14.71	26.47
Undecided	3	13	22	38.24	64.71
Disagree	4	10	32	29.41	94.12
Strongly Disagree	5	2	34	5.88	100.00

Figure 4.4 Sample of Analysis of Survey Data

an action research study by observing students' misbehavior in the classroom. The teacher might desire to identify the different types of disciplinary offenses. If a checklist were used to identify the disciplinary problems, several of the types of disciplinary offenses could be listed, and the teacher could observe students and place a check for each incident of misbehavior (see fig. 4.5).

After observing the students for a period of time (e.g., one week), the teacher could then tally up the marks (i.e., frequency or mode) and then identify the most frequent offenses. This approach could be very helpful in isolating a specific type of misbehavior so that the teacher could then develop an action plan to address the issue. This checklist could also be helpful in establishing a baseline of student behavior. Once the corrected action strategy is applied, the students can be observed again using the checklist. A comparison could then be made.

There are many uses for descriptive statistics in action research. Numerical information can assist the action researcher in providing quantifiable data in which to make analysis and interpretation. However, no amount of data can overcome the need for the action researcher to use common sense and inductive reasoning to ensure that the analysis and interpretation are meaningful for the action research study.

Directions: Mark an "x" for each time you observe the student misbehavior.

Student Misbehavior	Frequency	Total
Use of profanity	x	1
Defiance or disrespect	x x x	3
Talking without permission	x x x x x	5
Cheating or lying	x	1
Sleeping in class	x x	2
Apathy or low motivation	x x x	3
Harassing other students	x x	2
Tardiness or absenteeism	x x x x	4
Verbal fighting/arguing	x x	2
Physical fighting		0

Observation Period; 1 week   Grand Total; 23
Figure 4.5.   Sample of Observation Frequency Form

SIGNIFICANCE LEVELS AND TESTS OF SIGNIFICANCE

Although complex statistics are not generally used in action research, having a basic understanding of *tests of significance* can help the researcher in interpreting scholarly research literature, which is often used to support decisions in action research. For example, in a general sense, the steps in conducting *experimental research* consist of (1) establishing a hypothesis, (2) collecting data, (3) analyzing the data using an appropriate test of significance, and (4) accepting or rejecting the hypothesis at a selected significance level (see fig. 4.6).

For example, a null hypothesis might be established, such as "there is no significant difference in math achievement between students using graphic calculators versus students using traditional methods (Ho: $A = B$)." This experimental design can be considered a *pretest-posttest control group design* (see fig. 4.7). There are two groups in this design
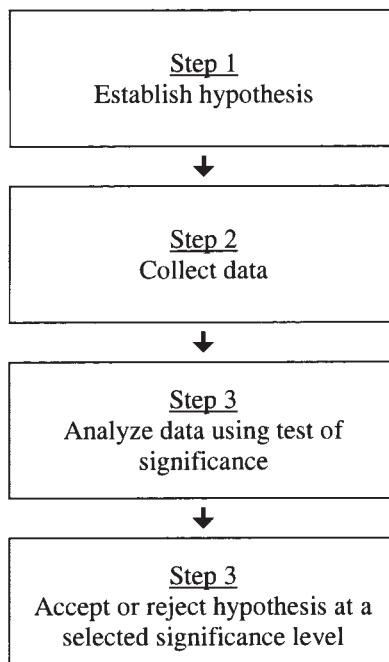
Figure 4.6. Steps in Conducting Experimental Research Using a Test of Significance

| Group 1: R   O   X   O |
| Group 2: R   O   O |

R = Random Sampling
O = Pretest or Posttest
X = Intervention

Group 1 = Experimental Group
Group 2 = Control Group

Figure 4.7.   Example of a Pretest-Posttest Control Group Experimental Design

selected through random sampling: (1) the *experimental group* (group of students using the graphic calculators) and (2) the *control group* (the group using the traditional method). There are also two variables in this design: (1) the independent variable, *the cause* (i.e., graphing calculator method) and (2) the dependent variable, *the effect* (the learning result by using the graphing calculator method). Incidentally, the posttest can be considered as the dependent variable since it is assessing the effect of the independent variable (e.g., increase in math achievement).

At this point, the researcher would then collect data (i.e., student pretest and posttest scores for the two groups). These test scores would then be analyzed using a *test of significance* in order to determine whether using the graphing calculator method is significant. If it is determined that using graphing calculators is significant, the researcher then *rejects the hypothesis* and concludes there is a significant difference in learning when using graphing calculators versus the traditional method.

The type of *test of significance* that is used to analyze the data is generally determined by statisticians. There are basically two types of tests of significance: *parametric* and *nonparametric*. The decision to use either of these kinds of tests is based upon the type of data being used. There are four categories of data (or units of measurement): *nominal*, *ordinal*, *interval*, and *ratio* (see fig. 4.8). Nominal and ordinal are generally considered nonparametric data and are the lowest forms of data. Nominal data are just a listing of data, such as occupations, student classes, and types of subjects. Ordinal data are similar but can actually be ranked in some order, such as socioeconomic classes, class rank, or numbers on a questionnaire (e.g., Likert scale of numbers 1–5 indicating extent of agreement). There are basically two types of parametric data: *interval*

Data Category	Description
Nominal	Listing of items/no order
Ordinal	Ranking of items/has order
Interval	Meaningful intervals
Ratio	Ratios between measurement with distinct intervals

Figure 4.8. Examples of Units of Measurement

and *ratio*. These data are more advanced than nonparametric data because they consist of distinct intervals, such as student test scores. Generally, we primarily use interval data in education (e.g., test scores and motivation scores). Ratio data are generally not used since they largely consist of physical measures having a true zero (i.e., difference between two variables). There are also certain assumptions that are typically associated with parametric data, such as the data are homogeneous and can form a distribution on the normal curve.

There are many types of parametric and nonparametric tests of significance (see fig. 4.9). For example, typical parametric tests of significance include a *simple t-test* (testing one group with a known population), *paired t-test* (testing one group under two conditions), *t-test for independent means* (testing two groups under one condition), and *analysis of variance* (ANOVA) (testing more than two groups under different conditions). Some nonparametric tests of significance include chi-square test (probability test, testing proportions in two or more groups), sign test (two random variables or groups), Mann-Whitney test (two independent groups), Wilcoxon test (matched paired groups), and Kruskal-Wallis test (three or more unmatched groups), which are associated with degrees of probability and have similar purposes as the parametric test of significance.

Parametric Tests	Nonparametric Tests	Description
Simple t test	Chi square	One group
Paired t test	Sign test	One group, two conditions
t test for independent means	Mann Whitney	Two independent groups, one condition
Analysis of Variance (ANOVA)	Kruskal-Wallis, Wilcoxon	Several groups and/or conditions

Figure 4.9. Examples of Parametric and Nonparametric Tests of Significance

Once the researcher has analyzed the data using an appropriate test of significance, he or she then is able to accept or reject the hypothesis at a selected significance level or probability level (often called a *p* value). The most common significance level used in education is .05 (see fig. 4.10). This level means that there is a 95 percent chance that a true difference exists between the experimental group and the control group and not because of random chance (coincidence) or poor sampling. Other significance levels used are .01 (or 99 percent confidence level) and .10 or (90 percent confidence level). The .01 significance level is a more stringent level and indicates that there is a 99 percent chance of a true difference between the two groups. Likewise, the .10 significance level would indicate that there is a 90 percent chance of a true difference between the two groups (a less stringent level).

The lower significance level generally indicates that there is stronger evidence of a statistical difference. However, using a more stringent significance level (e.g., .01) may cause the researcher to fail to reject a hypothesis that is actually false (i.e., a *type II error*). Likewise, rejecting a hypothesis that is a true null hypothesis is called committing a *type I error*.

The researcher does not need to be a statistician, but he or she needs to understand the concept of tests of significance in determining whether to accept or reject a hypothesis. Generally, when reviewing a scientific journal article or thesis, the researcher fundamentally needs to look for an asterisk (*) because this asterisk generally means that significance has been determined (e.g., null hypothesis is rejected). An easy way to remember whether to reject a hypothesis is by using the phrase "if the *p* is low, the null must go." Some common statistical symbols and definitions are found in figure 4.11.

Significance Level	Confidence Level
0.10	90% confidence
0.05	95% confidence
0.01	99% confidence

Figure 4.10.   Comparison of Significance and Confidence Levels

Symbol	Definition
X	Score
$\bar{x}$	Mean or arithmetic average
n	Number of subjects or scores
Σ	Sum of or sigma
ΣX	Sum of scores
N	Total number of subjects or scores
P	Probability level
r	Pearson product correlation
X^2	Chi-square test
F	Analysis of variance test statistic
df	Degrees of freedom
t	*t*-Test statistic

Figure 4.11. Definitions of Common Statistical Symbols

An example of using a test of significance can be found in figure 4.12. This example represents the output of applying a statistical paired *t*-test for two sets of student math scores (e.g., one class of students completing a math test and then the same group completing a second math test). The purpose of this statistical test is to determine whether there is a significant difference in how the students performed in test one as compared to test two. In interpreting the output in figure 4.12, the headings of *math 1* and *math 2* represent the two sets of student scores. The mean, or average, of the scores is presented along with the variance. The observations (14) indicate that there were 14 students in the class who completed both math tests. The hypothesized mean difference is zero (0) which indicates a *null hypothesis*. The letters "df" refer to *degrees of freedom* and the formula is $n - 1$. The researcher does not need to be concerned with this number nor the remaining numbers other than the *two-tail p value* (0.228). This is the critical number in that it represents the *probability level* (significance level). Remember, *if the p is low, the null must go*. In this case, .228 is higher than .05. Therefore, the researcher cannot reject the null hypothesis and concludes that there is

Math 1	Math 2	t-Test: Paired Two Sample for Means		
80	89			
87	86		Math 1	Math 2
80	84	Mean	81.28571429	82.5
85	86	Variance	56.37362637	63.19231
90	96	Observations	14	14
70	74	Pearson Correlation	0.89314051	
68	68	Hypothesized Mean Difference	0	
78	75	df	13	
79	78	t Stat	-1.26252738	
80	83	P(T<=t) one-tail	0.114468702	
96	95	t Critical one-tail	1.770933383	
84	80	P(T<=t) two-tail	0.228937403	
86	85	t Critical two-tail	2.160368652	
75	76			

Figure 4.12. Statistical Paired t test for Two Sets of Student Scores

no significant difference between how the students scored in the first math test as compared to the second math test. Interpreting other types of *t*-tests can be made in this similar way.

Another example of a statistical test of significance is presented in figure 4.13. This example represents an *analysis of variance* (ANOVA) *for repeated measures* (or called *replication*). This special ANOVA test is used for a situation when there is an experimental *pretest-posttest control group* design study. In this case, there are two groups of students: one is the experimental group (the class receiving a treatment such as special instruction), and the other group is the *control group* (the group receiving traditional instruction). When using this test, certain assumptions are made, such as the data are continuous, normally distributed, and with equal variances. In interpreting the output of this test (see fig. 4.13), the total number of students (14) is indicated, the mean (average), variance, degrees of freedom, and other data. As in the case of other statistical tests, the researcher is concerned with *p* value and whether it is higher or lower than an established significance level (.05). In this case, the *p* value is lower (.004) than .05. Therefore, the researcher concludes that there is a significant difference in the student scores, and the hypothesis in rejected.

Another common type of statistical test is a *correlation test*. Figure 4.14 presents the output of a correlation test displaying two sets of stu-

ANOVA: Two-Factor With Replication

Summary	X Group	Control	Total
Pretest			
Count	14	14	28
Sum	1138	1155	2293
Average	81.28571	82.5	81.8929
Variance	56.37363	63.2	57.9511
Post Test			
Count	14	14	28
Sum	1297	1155	2452
Average	92.64286	82.5	87.5714
Variance	27.63187	62.1	69.8836
Total			
Count	28	28	
Sum	2435	2310	
Average	86.96429	82.5	

	X Group	Control
Pretest	80	89
	87	86
	80	84
	85	86
	90	96
	70	74
	68	68
	78	75
	79	78
	80	83
	96	95
	84	80
	86	85
	75	76
Posttest	88	89
	92	87
	92	83
	96	86

Figure 4.13. Example of Statistical Analysis of Variance (ANOVA) for Two Sets of Student Scores Including a Pretest and Posttest

Posttest

75	76
88	89
92	87
92	83
96	86
94	95
90	75
84	68
85	75
90	78
94	83
96	96
92	80
96	84
80	76

Total

Count	28	28
Sum	2435	2310
Average	86.96429	82.5
Variance	73.88757	60.3

ANOVA

Source of Variant	SS	df	MS	F	P value	F crit
Sample	451.4464	1	451.446	8.627195	0.004925	4.02663
Columns	279.1079	1	279.018	5.332065	0.024942	4.02663
Interaction	451.4464	1	451.446	8.627195	0.004925	4.02663
Within	2721.071	52	52.3283			
Total	3902.982	55				

Figure 4.13. (continued)

dent scores (i.e., same set of scores used in figure 4.12). In this case, the researcher is concerned whether there is a positive, negative, or no relationship between how the students performed in *math test 1* as compared to *math test 2*. As you recall, correlation values range from -1 (a perfect negative relationship) to +1 (a perfect positive relationship). A zero relationship would have a value of 0. In interpreting the correlation test output presented in figure 4.14, the correlation value is .893. The researcher would interpret this value as indicating that there is a very high positive correlation between how the students score in math test one as compared to math test two.

The use of scientific research literature can be very helpful in conducting action research. Typically, an action research study may include scientific articles and, therefore, the ability to interpret these studies is important to the action researcher. A basic understanding of statistics is generally all that is needed to conduct meaningful action research.

Math 1	Math 2		Math 1	Math 2
80	89	Math 1	1	
87	86	Math 2	0.89314051	1
80	84			
85	86			
90	96			
70	74			
68	68			
78	75			
79	78			
80	83			
96	95			
84	80			
86	85			
75	76			

Figure 4.14.   Example of Statistical Correlation Test

USING GRAPHS AND DIAGRAMS

The use of *graphs and diagrams* can be very helpful for the action researcher in displaying a visual picture of the data. The common expression, "A picture is worth a thousand words," is particularly useful for the action researcher in quickly observing data and making analysis. Moreover, the use of graphs can provide an easy method of presenting the data to the reader. For example, bar graphs are one of the more commonly used methods to display survey data because they provide a breakdown of the information into columns (see fig. 4.15). A bar graph, often called a *histogram,* can display data as a line graph or in a vertical or horizontal direction. The researcher needs to select the best type of graph to display the data in the most easily understandable manner.

Pie charts are similar to the bar graphs except that a visual proportion of the segments is given relative to the entire whole (see fig. 4.16). For example, if the researcher were conducting a survey of students and wanted to present the responses indicating the percent of favorable responses among girls versus boys, a pie chart could be used. In essence,

Histogram
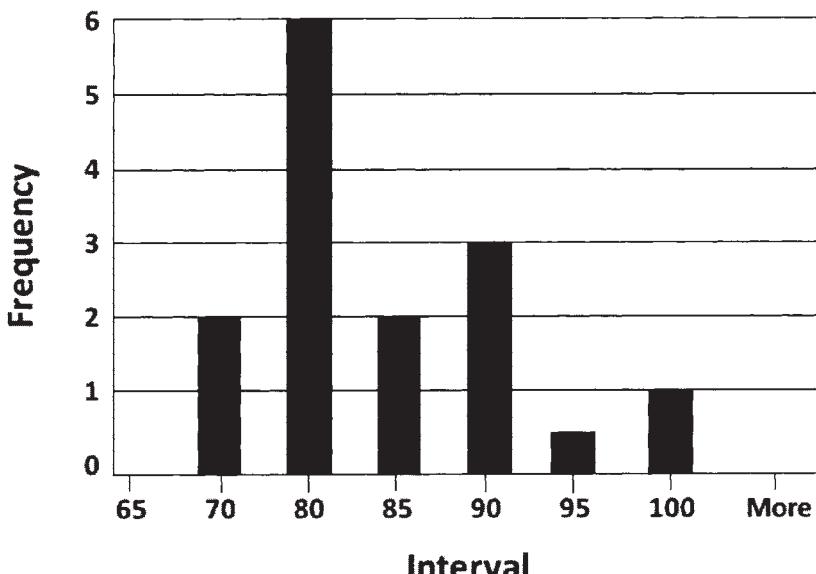
Figure 4.15. **Example of Bar Graph or Histogram**
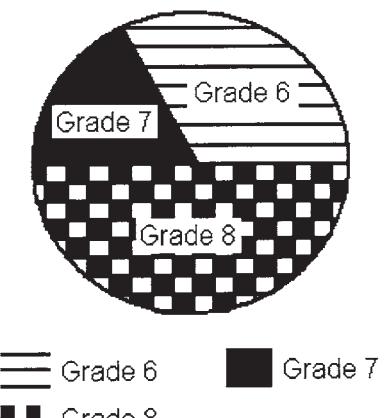
Figure 4.16. Example of Pie Chart to Display Data

the pie chart gives a visual orientation by allowing the researcher to cut the pie into different sizes to illustrate different proportions of responses. However, the researcher must be sure to not slice the pie into too many pieces; otherwise, the diagram will be cluttered and hard to understand. For example, the pie chart could represent the percentage of students who are deficient in reading per grade level. The pie chart could indicate that the students in eighth grade are 50 percent deficient in reading, seventh graders are 20 percent deficient, and sixth graders represent 30 percent of the students that are deficient (see fig. 4.16).

One of the more common computer software tools that can be used to create bar charts is Microsoft Excel. For example, if an action researcher wanted to construct a histogram for a set of math scores of students, the Excel program could be used. If the researcher had 14 students whose grades were 80, 87, 80, 85, 90, 70, 68, 78, 79, 80, 96, 84, 86, and 75, the data set could be converted into a histogram. The steps in performing this chart are:

1. Open Excel program
2. Enter the data set
3. Type (interval) in column E
   Column E, row 2, type 65

Row 3, type 70
Row 4, type 80
Row 5, type 85
Row 6, type 90
Row 7, type 95
Row 8, type 100
Click "enter"
Click "tools"
Click "data analysis" (Click "tools," "add ins," and check "analysis tool pak VBA" if needed)
Click "histogram" and "OK"
Input range equals A:A15
4. Bin range E1:E8
Check "labels"
Output range is G1
Click "OK"
The histogram for the display of this data should appear

The use of drawings can also be useful in displaying information visually. For example, if a teacher is conducting an action research study in an effort to identify factors that contribute to low student motivation, a *concept mapping* approach could be used (see fig. 4.17). Through

Figure 4.17.   Example of Concept Map to Display Problem Issues

the use of a brainstorming session with a group of fellow teachers, the teacher could visually display all the factors that could be contributing to low motivation. Once this concept map is displayed, the teacher could then conduct an action planning session to identify the most likely causes and suggest action plans for improvement.

WRITING NARRATIVE REPORTS

When conducting action research, the researcher will undoubtedly include a *narrative report*. The narrative report is a written description of the analysis of the data, which often includes references, measures of central tendency, and descriptive statistics. The report should be organized and succinct. The report should be written naturally, using short sentences and paragraphs, which can be most easily understood by the reader. Simple language should be used with proper formatting (e.g., use of headings, bold and italics, and a normal type size), which will help the reader understand the information. For example, the following is a sample narrative report, providing the analysis and interpretation of a school survey.

A. Description of School

The Smith Elementary School is located on 1st Avenue in New York City. There are about 500 children in Head Start through sixth grade. The student population reflects a diversity of backgrounds. Attendance is 96 percent, mobility is 39 percent, and truancy 2 percent. Ten percent of students are at or above the national norms for reading and mathematics. The school, however, has been experiencing progressively low student test scores, higher discipline rates, and higher teacher attrition rates. Also, the principal has reported that morale among the teachers is low, especially within the past two years.

B. Description of Action Research Study

Therefore, an action research study was conducted, which included an organizational survey, to assess the teachers' opinions regarding the school in order to identify the issues that were contributing to the current problems. The survey was conducted in the beginning of the school year, was anonymous, and centered on group opinions and issues. The questionnaire consisted of a series of closed-ended questions and two

open-ended questions asking the respondents to indicate what they "liked best about the school" and the "areas in need of improvement." The open-ended questions were typed and numbered for ease in reference and analysis. Although the responses were mainly summarized by the researcher based upon frequency (group strengths and concerns), the researcher also considered the "intensity" of the written responses (statements of serious concern). The report acted as a discussion tool in gaining further clarification through feedback sessions and in developing action plans for improvement.

C   Survey Analysis: Strengths of the School

1. Student-Centered Learning

More than eighty percent (80%) of the teachers believe the students at Smith School feel safe and are respected. Several written comments indicated that the teachers enjoy their students and that the students are well mannered, respectful, and responsible.

2. Quality of Education

The quality of education the students are receiving is positively viewed by many of the teachers (85%). Also, overall, eighty-two percent (82%) of the teachers believe that the students are receiving good instruction. Several written comments supported this opinion.

D. Survey Analysis: Areas of Concern for the School

1. Leadership

Without a doubt, leadership is a major concern of the teachers. One hundred percent (100%) of the teachers feel the principal is demeaning, condescending, and disruptive to the educational process. Several written comments indicated that the principal is disliked by the teachers and needs to be replaced.

2. Policies

There appears to be a major concern regarding school policies by the teachers. Only ten percent (10%) of the teachers feel the policies are fairly administered. Several written comments indicate that policies are: too strict and cause disciplinary problems among the students, contribute to low morale for both students and teachers, and create a negative climate within the school. Several written comments also indicated that poor policies are contributing to low test grades.

The narrative report generally combines the use of statistics, which are included in the written report and refer to supporting charts, diagrams, and tables. The length of the narrative report will depend upon

the nature of the action research study. If a teacher is conducting an action research study in his or her classroom, he or she might not need to write an elaborate report. In this case, the teacher might be more concerned with making improvements than documenting the entire process. However, documenting the process might be necessary if a teacher desires written evidence to support his or her good performance. Usually, when an extensive action research study is undertaken, a written report is generally necessary, and the final report is often bound into a three-ring binder.

CHAPTER 4 EXERCISES AND DISCUSSION QUESTIONS

1. List and explain examples of threats to validity.
2. Explain the bell curve and typical statistical terms associated with this model.
3. Using Microsoft Excel, enter data and construct a histogram (or bar chart).
4. Explain how to write a narrative report for action research.
5. What are typical charts and tables are included in an action research study?
6. What is a test of significance?
7. List and describe the purpose of four different parametric and four different nonparametric tests of significance.
8. Using Microsoft Excel, enter two sets of student test scores and run a paired *t*-test.
9. Now, using this same set of data, run a *t*-test for independent means.
10. Now, using this same set of data, run a correlation test.

5

SOLVING PROBLEMS AND TAKING ACTION

BARRIERS TO PROBLEM SOLVING

After an action researcher has analyzed the data, the next step is to identify the root cause(s) of the problem and initiate action. An important aspect to this problem-solving process is understanding some of the common barriers in problem solving (see fig. 5.1).

Making False Comparisons

One potential barrier for the action researcher is *making false comparisons* when attempting to solve a problem. For example, the causes of disciplinary problems at one school might be entirely different from those at another school. These differences (e.g., socioeconomics, teaching

- Making false comparisons
- Failing to identify the cause
- Failing to view the whole situation
- Falling into group polarization
- Failing to collaborate
- Failing to recognize hidden agendas
- Treating the symptom versus the cause of the problem

Figure 5.1.   Examples of Barriers to Problem Solving

staff, environment, community, culture, and facilities) contribute to the students' behavior. If the researcher is trying to identify the root cause of a problem, he or she should be careful not to make a false comparison between schools (Tomal, 1999).

Failing to Identify the Cause

Another frequent barrier to problem solving is when the researcher attempts to solve a problem based upon a proposed solution *without first identifying the cause*. For example, an administrator who is facing a disciplinary problem might state, "The solution to our problem is that we need more security officers" or "The solution to our disciplinary problem is that we need more enforcement of policies by the administration." Attempting to solve a disciplinary problem based upon a proposed solution is futile without first isolating the actual cause.

Failing to View the Whole Situation

Another potential barrier is when the researcher *fails to anticipate the widespread effects* of an action upon the entire organization. For example, if an educator is working with a student who is having difficulty in learning and he or she feels that positive reinforcement is needed for the student, other students might become resentful. In this example, the educator could create additional problems by taking action to resolve one problem (i.e., failing to view the whole situation).

Falling Into Group Polarization

The barrier of *falling into group polarization* is common when researchers are influenced by people (e.g., fellow colleagues, community members, or parents) to select a specific action. For example, if a teacher is working with a student who is having difficulty in learning, he or she might jump to the conclusion that the student is suffering from a learning disability, if influenced by the school psychologist or local school policy. The teacher might become "polarized" into thinking that all learning problems are associated with a learning disability.

Failing to Collaborate

When researchers *fail to collaborate* in solving problems, the results of the action plan will be compromised. The foundation of action research is based upon a collaborative effort in solving problems. Action researchers should always attempt to involve other people, especially the subjects of the study, when solving a problem. Groups of people generally make better decisions than individuals. For example, when surveying the opinions of teachers, researchers should include them in the problem-solving and action-planning process.

Failing to Recognize Hidden Agendas

Problems can be difficult to solve when action researchers are hampered with *hidden agendas*. For example, if a teacher would like to implement a new curriculum, he or she might encounter resistance from other teachers who want to stay with the current curriculum rather than expend the additional effort in learning the new curriculum.

Treating the Symptom Versus the Cause of the Problem

A common problem of researchers is to *treat the symptom versus the cause of a problem*. The analogy of taking an aspirin for a headache instead of treating the cause of the headache applies to action research. Researchers need to remain open-minded when identifying causes for a problem. For example, if an action researcher feels that the best method to address student absenteeism is through training teachers in absenteeism, it will be futile if the root cause of the problem is actually an ineffective school discipline policy (Tomal, 1999).

STEPS IN SOLVING PROBLEMS

Prior to planning and initiating an action, the action researcher must first identify the cause of the problem. There are four basic steps in problem solving (see fig. 5.2).
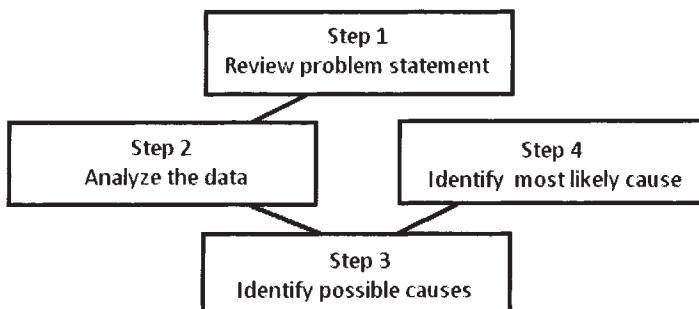
Figure 5.2.   Steps in Problem Solving

Review Problem Statement

In step one it is helpful for the researcher to reexamine the *problem statement* in order to keep focused upon the objective. For example, if a teacher is experiencing a significant upsurge in disciplinary problems in the classroom (i.e., the problem statement), the teacher needs to analyze the data from this perspective.

Analyze the Data

Step two entails the researcher *analyzing the data* for the problem. For example, if a teacher is trying to identify the cause of a current discipline problem, he or she could start by examining differences from past disciplinary problems. The teacher could identify differences, such as gender, class grade, frequency of each disciplinary offense, and degree of misbehavior. The teacher might identify the "what is" versus the "what is not." For example, the "what is" could be identified as predominantly freshman and sophomore girls who are fighting versus junior and senior boys (the "what is not"). In this manner, the teacher can better analyze the data to discern the problem by pinpointing the actual facts to a disciplinary situation.

Identify Possible Causes

In step three, the teacher should list the *possible causes* of the problem. For example, the teacher might benefit from conducting a brainstorming session with his or her colleagues. This collaborative approach

could be effective in identifying a multiplicity of potential causes to the problem.

Identifying Most Likely Cause(s)

After the teacher has listed all the possible problems, he or she should then identify *the most likely cause(s)*. In step four, the teacher actually completes the problem-solving phase of the process. There might also be more than one cause of the problem, in which case the teacher should write down the actual causes and rank them in terms of priority.

MANAGING CHANGE

Without a doubt, the most important step to action research is planning and taking action. Without taking action, there can be no action research. The essence of action research is to implement meaningful actions that can solve the problem, which always involves *change*. Therefore, basic to taking action is the need for an action researcher to understand the change process. Whether the change involves students, teachers, parents, or the community, there are several natural resistances to change (see fig. 5.3).

Threat to Security

A common resistance to change for some people is the inherent feeling that any deviation from the status quo will result in a personal loss. For example, if a teacher has been teaching at the first-grade level for several years and then is asked to teach at the middle-school level, feelings of failure or inadequacy could occur.

- Threat to security
- Fear of the unknown
- Lack of understanding
- Desire for status quo
- Potential loss of power

Figure 5.3. Resistance to Change

Fear of the Unknown

Similar to the feeling of insecurity is the fear of not knowing what the new change will bring. For example, if an administrator is considering an extensive restructuring of a school district, the teachers and staff will naturally feel apprehensive about how the change will affect them. They might feel that the benefits will not outweigh the risks of the change.

Lack of Understanding

The threat to security is often compounded when people have a lack of understanding of the change effort. This lack of understanding might result from not having sufficient information or control over the change process. Change can create stress in people when they do not have ownership in the change effort. For example, if a teacher is proposing that students participate in a new type of testing program, the students could develop stress if they don't have a thorough understanding of the procedures for the new testing program.

Desire for Status Quo

People can be creatures of habit. If people are content with the present situation, they will have little desire to change. Change often requires a degree of initiative and work, and people might not want to exert the effort. For example, elementary students often desire routine in their life. Therefore, they naturally resist any changes in classroom procedures.

Potential Loss of Power

If people have an established position of power within the organization, there will be a tendency to resist change because they feel a potential loss of power. This loss of power can occur at many different levels. For example, a department chairperson would feel a loss of power if his or her position would be eliminated and he or she would be required to go back to strictly teaching. Likewise, a student might feel that his or her power is threatened if he or she has been acting as a group leader

in a cooperative learning program and the teacher desires to eliminate this program. In both cases, the loss of power can threaten their security, and they might resent any change effort.

When planning the action step, the action researcher must understand the basic steps to initiating change (see fig. 5.4). Following these basic steps can help ensure that the change process will be successful.

Communicate Purpose

One of the surest ways to undermine a change effort is to fail to make the purpose of change clear. People need to have a logical, well-defined reason for the change. For example, if an administrator is considering making an organization-wide school change, he or she would need to hold several meetings with the staff to explain the purpose of the change, the benefits of the change, and how the change will affect everyone. The administrator might also consider providing a written explanation to all
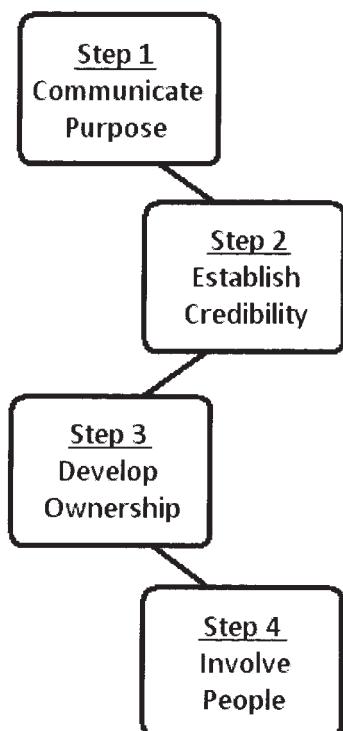
Figure 5.4.   Steps for Successful Change

stakeholders (e.g., students, teachers, parents, staff, and community members) about the proposed change effort. The change agent can seldom provide too much communication regarding the purpose of the change. The best rule is to provide more information than you feel is necessary to ensure that everyone has a thorough understanding of the change effort.

Establish Credibility

There cannot be a lack of respect or trust in the initiator of the change effort. One of the best ways to overcome resistance to change is to provide good leadership. If people feel confident in the leader's skills, then the chances for success will be improved. For example, if a teacher is considering implementing a new curriculum program, he or she might obtain the endorsement of a respected colleague to help promote the change effort.

Develop Ownership

Once people have a clear understanding of the purpose of the change and feel there is credibility in leadership, the next step is to ensure that everyone has a feeling of ownership in the change effort. If people feel a personal ownership in the change effort, they will likely be more willing to be actively involved in the change process.

Involve People in the Change Effort

Involving people in the change effort is the last step. Although not all people will want to be involved, the action researcher should try to include as many people as possible. Also, the more people who are involved in the change effort, the more likely others will want to participate.

PLANNING AND INITIATING ACTION

Once the action researcher has considered the conditions for successful change, he or she must plan and initiate the action. For example, if

an administrator has conducted an action research study and plans to initiate a school-wide change effort, he or she needs to communicate the purpose of the change, establish credibility, and then involve people in the change effort. The change effort will require the involvement of all stakeholders, such as teachers, administrators, students, board members, parents, and community members. The administrator might first begin by working with a steering committee made up of various stakeholder representatives, such as a teacher, administrator, board member, parent, union representative, and a community member. The purpose of the committee would be to help develop the action plan; provide inspiration, credibility, and direction for the school-wide change effort; help overcome any potential roadblocks; and provide resource support (e.g., finances, materials, facilities, and time). The committee might begin the first phase by developing a clear vision statement for the action to be taken. The vision statement might represent a crystallized long-range picture of what should be accomplished at the school. The vision statement could act as a foundation for the ongoing process, to help maintain a central focus while implementing the change effort (Tomal, 1999).

After the mission statement has been established, the steering committee might develop the statement into a school improvement plan (SIP). Once the SIP is complete, the committee might want to ensure that everyone understands the intended change effort by conducting "awareness sessions." This communication effort can be a crucial component to ensure that everyone understands the action, expectations, and their respective roles in accomplishing the action plans.

The next step in initiating the school-wide improvement plan might be the formation of quality teams consisting of stakeholder representatives that could work on the organizational issues. The quality teams could work on such areas as multiculturalism, facilities, security, student achievement, discipline, parent and community relations, and technology. All team members could be trained in team work and group facilitation to improve their effectiveness.

The teams could also consist of stakeholders who genuinely desire to work on school-improvement issues or are associated with the defined issue by nature of their work responsibilities. For example, if the issue is to improve discipline, the school disciplinary dean might be involved on this quality team. A list of each team and issue could be posted on a

Education Issue: Low math achievement
➡ *Potential Action:* Cooperative learning program

Education Issue: High discipline problem
➡ *Potential Action:* New discipline program

Education Issue: Low science achievement
➡ *Potential Action:* Problem-based learning

Education Issue: Learning difficulties
➡ *Potential Action:* Collaborative learning program

Education Issue: Low motivation
➡ *Potential Action:* Motivational rewards program

Education Issue: Low student morale
➡ *Potential Action:* Self-esteem program

Education Issue: Low attendance
➡ *Potential Action:* New attendance policy

Education Issue: High teacher stress
➡ *Potential Action:* Stress management program

Education Issue: Stress and student conflict
➡ *Potential Action:* Parent mediation program

Education Issue: Poor reading skills
➡ *Potential Action:* Home reading program

Figure 5.5.   Methods of Implementing Action

bulletin board where interested participants could sign up. This process would also help ensure effective communication and reinforce the purpose of the change effort. The administrator might also provide guidelines for the quality teams, which could include voluntary membership, ground rules for conducting meetings, and work goals.

The quality teams could be led by a facilitator. The role of the facilitator could be to provide timely communications to all members, credibility for the change effort, and reinforcement for the team's good performance. The facilitator can also keep the teams on task, develop meeting agendas and minutes, and act as communication link with the steering committee and stakeholders. The actual implementation of the actions could also be accomplished through the efforts of the quality teams. The administrator should not implement the school-wide

change effort by him- or herself. Involving other people is essential to promote ownership and to maximize the use of human resources. For example, a discipline team might develop a new discipline program, but the discipline dean might actually implement it. The quality team could monitor the progress and act as a liaison with the steering committee. The team could also be later involved in evaluating the results of the actions (Tomal, 1999).

The many methods of implementing actions depend on the nature of the problem (see fig. 5.5). The process of initiating action in the classroom is not as elaborate as implementing school-wide change. However, the teacher should consider the conditions for successful change when implementing classroom action. For example, if a teacher is considering the use of a cooperative learning program to improve math learning, he or she might want to consult other teachers who have utilized the program to understand the best method for success. Likewise, the teacher should explain the purpose of the cooperative learning program to the students, highlight potential for success, and explain how the program will be implemented.

DATA-DRIVEN DECISION MAKING (DDDM)

Data-driven decision making is a process of gaining information in a timely manner so educators can make immediate educational changes that improve learning. The uniqueness of this process is that it allows educators to gain information on a more timely basis rather than waiting too long to make changes. This technique is an outgrowth of the total quality management (outcomes based education) philosophy that encourages educators to be more responsive to their students' needs. For example, rather than waiting an entire year to realize that students are not performing, the educator would collect data during the school year and make immediate corrective actions. The use of data-driven decision making requires a paradigm shift for many educators. Typically, the traditional teacher would provide instruction and then assess learning. This new process allows teachers to be simultaneously providing instruction as well as collecting useful data in order to make assessments and improvements to the instruction. One of the primary objectives of the No

Child Left Behind legislation is to provide accountability to the federal government for education in the United States. Data-driven decision making can be one process that can help to provide accountability by providing timely student assessment and educational improvements.

Action research can be a very powerful strategy in supporting data-driven decision making. Figure 5.6 outlines the typical process of using action research to support data-driven decision making. The steps for both of these processes are similar. The *statement of the problem* should include the selection of the subject (e.g., mathematics, reading, science) and the students involved in the learning. The next step involves *collecting data*. Prior to collecting new data, the educator should establish a baseline of data for the students and then collect new data on the students on a continuous basis. The third step involves *analysis and feedback*. At this stage, the educator performs an assessment of the data, makes preliminary conclusions, and then initiates benchmarking. Benchmarking is critical at this point in order to conduct a review of literature and activities from academic research and other educational institutions in selecting relevant interventions or instructional improvement methods that could help the students perform better. For example, if the educator is determining that his or her mathematics students are struggling, he or she may investigate other interventions (such as use of graphing calculators or technology) to improve the students' learning. Once these other interventions are identified, the educator should select which one(s) to implement. The next step, *action planning*, involves the actual selection of the intervention and acquisition of materials and procedures needed for the implementation. This step may involve purchasing of new materials and technology and gaining approval from administrators. Step five involves *taking action*. In this step the educator

Action Research Steps	Date-driven Decision Making
1. Problem statement	1. Select subject and students and define goal
2. Collect data	2. Establish baseline data and continuous data on subjects
3. Analysis and feedback	3. Perform assessment, benchmarking, and draw conclusions
4. Action planning	4. Decide on improved learning intervention
5. Take action	5. Implement intervention
6. Evaluation and follow-up	6. Reassess subjects and make continuous improvements

Figure 5.6.   Using Action Research to Support Data-driven Decision Making

would actually implement the new intervention(s). The last step would involve *evaluation and follow-up*, in which the educator would reassess students' progress and make continuous improvements.

CHAPTER 5 EXERCISES AND DISCUSSION QUESTIONS

1. List examples of barriers to problem solving.
2. List steps in problem solving.
3. List typical examples of resistance to change.
4. List and describe examples for successful change.
5. Describe the model of action research and data-driven decision making.
6. Explain the term *polarization*.
7. Explain examples of how to take action for educational improvement.
8. Explain ways in which an action researcher can involve various school stakeholders into the school improvement process.
9. Explain the role of the *facilitator* in working with quality teams.
10. Describe examples of subject areas that could be improved through use of data-driven decision making.

6

EVALUATING ACTION RESEARCH

AREAS FOR EVALUATION

The final step in taking action is to evaluate the results. Without the evaluation step, the action researcher never knows if the results of the action were successful or if the problem has been resolved. Depending upon the action researcher topic, several areas could be evaluated (see fig. 6.1).

Impact on Student Learning

At the core of action research for education is the impact of actions on student learning. One of the central goals of education is to improve student learning. Therefore, this area should be assessed. The assessment of student learning can be accomplished through many methods, such as structured tests, portfolios, performance activities, observations, and informal evaluations. For example, if a teacher implemented graphing calculators to improve mathematical comprehension, the use of problem-based tests could indicate change in learning.

- Impact on student learning
- Impact on student behavior
- Impact on school climate
- Cost benefit of action
- Feasibility/utility of action
- Accuracy and effectiveness of action

Figure 6.1.   Areas for Evaluation

Impact on Student Behavior

The behavior of students is directly related to student performance. Misbehaving students generally do not obtain optimum learning and are disruptive to the learning of other students. For example, several methods of assessing student behavior include: number of disciplinary offenses, student motivation, level of morale, self-esteem, cooperativeness, socialization, group interaction, and amount of time on-task versus off-task behavior.

Impact on School Climate

The use of action research is especially suitable for initiating improvement in school climate. School climate consists of such factors as morale, motivation, spirit, commitment to the school, teamwork, and overall self-esteem. The methods to assess school climate could be undertaken through use of a climate survey or direct observation.

Cost–Benefit

Although the actions might be deemed successful, the benefits might not outweigh the cost of the actions. The benefits must justify the financial resources expended. For example, if an administrator has initiated an action plan of increasing the number of teachers per students as a pilot study for learning for a specified grade level, the amount of financial resources in obtaining additional teachers might not outweigh the benefits of the increased learning and might be cost-prohibitive.

Feasibility and Utility of Action

Another area to evaluate in action research is the feasibility and utility of the actions. *Utility* refers to the timeliness and usefulness of the action while *feasibility* pertains to the appropriateness of the action to the educational environment. Factors impacting utility and feasibility include the total resources needed to implement the action (human, financial, equipment, materials, etc.).

Effectiveness of Action

Another consideration in assessing actions includes the effectiveness of the action. If the initial assessment of an action suggests that there has been student improvement in learning, care must be exercised to ensure that the learning is truly meaningful on a long-term basis. For example, a thorough evaluation might reveal that the action has only short-term effects and, therefore, is not reliable. Likewise, if there appears to be improvement in student learning, the researcher might need to execute multiple assessments to determine if the action truly caused improvement or if it was the result of simply chance, inaccurate data collection, or invalid interpretation. Given that action research is not an exact science, there is a high threat of personal bias in interpreting the effectiveness of the action taken.

METHODS FOR EVALUATING RESULTS

The action researcher can use many methods to evaluate the effectiveness of actions. An evaluation process that could be undertaken for a school-wide change effort might include the use of quality teams and stakeholders in evaluating results of the entire change effort. Follow-up surveys, individual and group interviews, student academic assessment, feasibility studies, cost-benefit analyses, and benchmarking comparisons can all be part of the process.

One key to understanding the evaluation component of action research is the concept that this research is often a cyclical process. French and Bell (1995) state that "action research is a sequence of

events and activities . . . and it is a cycle of iterations of these activities, sometimes treating the same problem through several cycles and sometimes moving to different problems in each cycle" (p. 139). Therefore, action research is often considered as a method of continuous improvement for an organization. For example, the researcher might use an organizational survey as the intervention method for conducting action research to improve a school district. He or she could use this same organizational survey over and over again to assess the results of actions in attempting to make continuous improvements.

Last, part of the evaluation process should include the distribution of rewards for people who contributed to improvements. The researchers could award people for their efforts and achievements through various intrinsic and extrinsic reward systems, such as t-shirts, buttons, certificates, and luncheons. The key to reinforcing successful action research is to ensure that the participants are rewarded for their actual contributions. Celebrating the successes of action research can be a powerful stimulator in making continuous improvements and undertaking additional research studies.

EVALUATING ACTION RESEARCH STUDIES

Besides evaluating the outcomes of the action taken in the research study, it is often important to evaluate the manuscript. The action research study is constructed similarly to other research studies such as those using qualitative and quantitative designs. When evaluating the action research manuscript, the first page is the *title*. Generally, the title should be limited to fifteen to twenty words and should state the who, what, and where of the study. Specifically, the title should state the type of study, where it was conducted, and the topic of the study. The title should not be too short or too long. The title should be written succinctly and be clear and concise. The title should also be centered on the cover page using upper and lower case letters. The cover page should also contain any other relevant information, such as the author(s) of the study, the date, and the sponsor of the study.

Typically, an action research study will contain an *abstract*. The abstract is an executive review of the study and is written succinctly and

concisely and is generally limited to one page. Essentially, the abstract allows the reader to understand the entire contents of the study without needing to read the entire manuscript. Writing a good and concise abstract is often difficult for the novice action researcher. The abstract should begin with the purpose of the study and a descriptive statement of the problem. It then describes the subjects of the study, location, and other relevant information. It also contains the method of data collection, data analysis, action, results, and evaluation. The abstract should be comprehensive enough so that the reader understands the outcomes of the study.

The study should also contain a *table of contents*. It should be limited to one page, if possible. The table of contents should contain each of the chapters of the study and subtopics. Page numbers should also be clearly indicated for each of the topics of the study and all information properly aligned and formatted on the page.

All action research studies, like any study, should contain an *introduction*. Typically, the introduction begins with the nature of the problem. The nature of the problem can be described as providing a background to the topic. It is generally written by starting from a broad viewpoint, providing sources to back up statements, and then concluding with "narrowing down to the topic" of the study. The writer should avoid making generalized and blatant statements. Also, this section should contain relevant sources to back up the researcher's comments and appropriate citations. The introduction should also contain a clearly defined statement of the problem. Unlike quantitative research, which typically addresses a hypothesis, the action research uses a statement of the problem to be addressed. This section should also include a relevant list of terms, explain how the researcher is defining the terms, and should include appropriate citations. Lastly, this section ends with providing the significance for the study (why do the study and possible benefits) as well as any other information, such as organization of the study. Sometimes the limitations (factors that hinder the quality of the study) are described in the introduction, but these are more generally placed in the last chapter of the study.

The *literature review* often is one of the large sections of a study. Like any study, the literature review should contain an exhaustive review of all the literature relevant to the topic. The sources for the review should

contain both supporting and non-supporting research for the topic. The researcher should not be biased by presenting only positive viewpoints. This section should also contain relevant primary sources versus secondary sources. Primary sources are those sources that come directly from published studies and journals versus secondary sources that come from books (i.e., second-hand reviews). The accuracy of a primary source is going to be much higher than that of secondary sources. The literature review often concludes with a summary table whereby the reader can scan the entire literature without reading the entire chapter.

The next chapter of the action research study is the *design*. In this section, the researcher should clearly define all the subjects for the study, procedures for selecting subjects, method of data collection, and any instrumentation. For example, the method of data collection might be observing subjects, analyzing raw data, conducting a survey, or conducting focus or group interviews. Appropriate tables should be used to describe the method of data collection, and copies of all instruments and relevant validity and reliability information should be provided.

The next chapter is the *analysis of the data*. Sometimes this chapter might also contain results of the study as well. However, a clear understanding of how the data was analyzed should be presented. Appropriate tables and charts should be included to help the reader understand the meaning of the data. Finally, the action taken in the study should be clearly defined, as well as any feedback that was conducted with the subjects and relevant benchmarking or literature sources.

The next section describes the *results of the study*. The results section should describe how the outcomes addressed the statement of the problem. This section can be a little tricky in that the actions may not entirely solve an educational problem and may only make limited improvements. Therefore, *addressing the problem* may be a more appropriate term, given that other issues often arise as a result of conducting the action research study. For example, if an action research study is conducted to make school improvements (statement of the problem), by making these improvements the researcher may discover other issues within the school such as negative culture or poor disciplinary behaviors and instruction that may need to be addressed as well.

The last section should also include *conclusions and evaluation follow-up*. In this section, the researcher describes relevant conclusions,

Title Page
_____ Does it state the who, what, and where of the study?
_____ Is the title limited to fifteen to twenty words?
_____ Is it clear, concise, and comprehensive?

Abstract
_____ Is it succinct and limited to one or two pages?
_____ Does it state the purpose, subjects, design, data analysis, actions, and conclusions?

Introduction
_____ Is the background or nature of the problem comprehensive?
_____ Is there a clear statement of the problem versus a hypothesis?
_____ Is there a descriptive and comprehensive list of definition of terms?
_____ Is the significance of the study clear?
_____ Are other subtopics (e.g., organization of the study) clear?

Literature Review
_____ Does it contain both supporting and non-supporting sources?
_____ Are the sources current?
_____ Are the sources relevant?
_____ Is there a summary table at the end of the chapter?
_____ Is the review comprehensive and well written?

Action Research Design
_____ Are the population and subjects clearly defined?
_____ Are the intended action procedures descriptive and well defined?
_____ Is the instrumentation and method of obtaining data clear?
_____ Is the intended action and other information clear?

Analysis of Data
_____ Are the statistics selected appropriate for the study?
_____ Are all data tables clear and accurate?

Results of the Action
_____ Do the results address the statement of the problem?
_____ Do the results provide meaningful outcomes?
_____ Are limitations to the study presented?
_____ Are the results substantiated by evidence?

Conclusions and Proposed Evaluation
_____ Are conclusions and recommendations presented?
_____ Are follow-up actions recommended?

References and Writing Quality
_____ Are sufficient references contained?
_____ Do references follow appropriate APA style (or other style)?
_____ Is the writing done in third person?
_____ Is the writing of high quality?

Figure 6.2.   Checklist for Evaluating Action Research Studies

makes recommendations for future actions, and provides implications to the educational field.

Last, the researcher should evaluate the *references* to ensure that they are accurate, relevant, and current. An evaluation of all the materials in the appendix should be completed to ensure accuracy and completeness (see fig. 6.2).

CHAPTER 6 EXERCISES AND DISCUSSION QUESTIONS

1. List examples of areas for evaluation.
2. Describe methods for evaluating results of action research.
3. List typical items to assess in an action research study.
4. Describe the characteristics of a good title.
5. Describe the characteristics of a good abstract.
6. Describe the characteristics of a good literature review.
7. Describe the characteristics of good research design.
8. Describe the characteristics of good analysis of the data.
9. Describe the characteristics of a good results section.
10. Describe the characteristics of a good conclusion section.

7

CONDUCTING ACTION RESEARCH

SAMPLE RESEARCH STUDY ANALYSIS

The purpose of this chapter is to provide examples of published action research studies and to describe the components within the action research model.

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COLLABORATIVE PROCESS INTERVENTION:
AN ACTION RESEARCH STUDY

Stage 1: Problem Statement/Initial Diagnosis

The study presents the problem statement indicating that the school was on the verge of an educational crisis and was experiencing low teacher morale, conflict, mediocre student test scores, high disciplinary incidents, and poor facilities and instructional materials.

Stage 2: Data Collection

The method of collecting data consisted of an organizational survey and examination of student test scores from the Iowa Tests of Basic Skills of Reading and Total Math.

Stage 3: Analysis/Feedback

The analysis consisted of establishing a benchmark of the student tests based upon the Iowa Tests of Basic Skills of Reading and Total Math, as well as the mean scores from the organizational survey, which consisted of items such as staff morale, school facilities, instructional programs, and fiscal management. The feedback process involved reporting the results of the survey to the stakeholders (e.g., educators, parents, and community members).

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Stage 4: Action Planning

The action planning process consisted of forming quality teams (e.g., multicultural, policies, student achievement, and safety) in which action plans were developed.

Stage 5: Implementation

The action plans were implemented, which included an extended school day, multicultural events, staff development, improved school policies, upgrading school facilities, and new instructional programs.

Stage 6: Evaluation and Follow-up

An evaluation of the results of the actions included improved test scores (Iowa Tests of Basic Skills: overall reading, 3.5 percent; total math, 1 percent); improved staff morale, school facilities, instructional programs, and fiscal management; and decreased student disciplinary incidents and crime based upon a follow-up organizational survey, observations, and test analyses.

COLLABORATIVE PROCESS INTERVENTION: AN ACTION RESEARCH STUDY

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ABSTRACT

This action research study presents an overview of a Collaborative Process Intervention (CPI) used in initiating school-wide change for an elementary school in northeast Illinois. This school, on the verge of an educational crisis, was experiencing problems, such as low teacher and staff morale, conflict, mediocre student test scores, disciplinary problems, budgetary concerns, and inadequate instructional programs.

The CPI strategy consisting of five action research phases (planning, assessing, executing, implementing, and evaluating) was utilized. It integrated the use of visioning, benchmarking, survey feedback, quality teams, scoreboarding, reward structures, continuous improvement, and other techniques.

Quality teams (e.g., Multicultural, Policies, Student Achievement, Parent and Community Relations, and School Improvement Plan) were used. Actions implemented included: improved student remediation program, multicultural events, staff development, policies, facility upgrading, new instructional and curriculum programs, and changed leadership and teachers, etc.

Results included improved test scores (Iowa Tests of Basic Skills: Overall Reading 3.5%, and Total Math 1%), and improved teacher and staff morale, increased parent and community involvement, reduced conflict and discipline problems; and improved facilities, fiscal management, leadership, and

instructional and curriculum programs. Limitations included: lack of administrative commitment, limited time, and use of political agendas. However, the CPI strategy offered a viable approach in making school-wide changes and improvements.

INTRODUCTION

Schools have been faced with a myriad of challenges in recent years. The need to improve student achievement, attendance, discipline, safety and security, multiculturalism, leadership, fiscal management, technology, and a student-centered learning environment are but a few of the ongoing concerns of today's educational institutions. Although educational leaders have utilized various organizational models and school-improvement plans (SIPs), they have often fallen short of expectations in providing meaningful institutional change (Sergiovanni, 1996; Wagner & Kegan, 2006).

A variety of intervention strategies have been used by educational consultants to help guide schools through the change process (French & Bell, 1995). One such intervention is called the Collaborative Process Intervention (CPI), which has been developed by the author and has been utilized. This strategy focuses on making meaningful organizational improvements through the collaborative efforts of all stakeholders (e.g., teachers, administrators, students, board members, parents, and community members) through shared decision making. The CPI strategy is based upon taking an action research approach in identifying issues in need of improvement through a systematic process of data collection, and then taking actions to address the issues.

CONTEXT OF STUDY

Statement of the Problem

This action research study was undertaken at an elementary school in northeastern Illinois. The school had more than 600 students from early childhood through eighth grade. The students represented diverse ethnic groups with a large population of Hispanics and African Americans. The staff consisted of about seventy-five employees, such as teachers, administrators, a nurse, psychologists, a social worker, a speech pathologist, a security officer, clerks, and custodians.

The school had recently experienced a significant number of problems, such as poor teacher morale, mediocre student test scores, an increase in disciplinary incidents, inefficient fiscal operations, lack of instructional materials, poor facilities, parent and community complaints, conflict among the teachers, and an upsurge in student crime. The principal had also resigned, and an interim principal was assigned to the school until a permanent principal could be hired. Therefore, based upon these problems, the CPI strategy was undertaken by the research consultant to identify the root causes of the school's problems and to make organizational improvements.

Method and Procedures

The CPI strategy consisted of a five-phase process of planning, assessing, executing, implementing, and evaluating. It entailed a comprehensive step-by-step process in working with all stakeholders of the school in bringing about meaningful change within the organization.

Phase one: planning   This first phase began with the research consultant working with a steering committee (consisting of various stakeholder representatives, such as teachers, administrators, board members, parents, union representatives, and community members). The purpose of this committee was to understand the entire CPI process, provide inspiration and direction for the school change, overcome roadblocks, and provide resource support (e.g., finances, materials, facilities, and time).

The first goal of this phase was to develop a clear Vision Statement that reflected the needs of the students. This Vision Statement represented a crystallized long-range picture of what should be accomplished at the school (Daresch & Playko, 1995). The development of the Vision Statement required the use of several team-building sessions to reduce conflict and build interpersonal relationships and trust among the team members. The Vision Statement became the foundation for the ongoing process and helped everyone maintain a central focus while making educational decisions.

After the Vision Statement had been established, the Steering Committee next developed this statement into a Vision Plan, which included general mission statements, organizational goals that were aligned with district and state goals and outcomes, and a description of the CPI strategy. This Vision Plan also outlined the strategy in developing and implementing the School Improvement Plan.

Once the Vision Plan was completed, the Committee scheduled "awareness sessions" with all stakeholders to communicate the overall plan. Letters

describing the Vision Plan were also sent to all stakeholders. This communication process was a crucial component in ensuring that everyone understood the collaborative process, expectations, and their respective roles in accomplishing the goals and objectives.

Phase two: assessing   The purpose of Phase Two was to clearly identify the organization's strengths and areas in need of improvement (i.e., the major educational problems and issues faced by the school). Assessment areas included curriculum and instruction, safety and security, communications, morale, technology, student transportation, facilities and resources, student centeredness, work responsibilities, student performance, leadership and staff development, and parent and community involvement. This information was collected through organizational surveys, employee interviews, and analysis of student test scores (Greenberg & Baron, 1993).

An overall report (i.e., the strengths and areas in need of improvement) was prepared for the entire school. A copy was also given to the District office. The research consultant attempted to ensure anonymity and openness among the respondents. Some of the general areas in need of improvement included: leadership, school policies and procedures, communications, organizational climate, curriculum and instruction, educational resources, teacher committees, parent-community involvement, building facilities, school temperature, multicultural appreciation, administrative and organizational structure, and school budget and allocation of funds.

Once the reports were prepared, a series of "feedback sessions" were held for all stakeholders. The feedback sessions allowed everyone to understand the results of the assessment, clarify issues, and ask questions about the process. An overview of the next step in the CPI process concluded the feedback sessions.

As part of the organizational assessment, benchmarking, a process of identifying the best practices of other schools, was used as a basis for achieving greater performance (Camp, 1989). The benchmarking process was conducted by a team of teachers.

Although the benchmarking process could have been done continuously throughout the school year, the identification of suitable educational programs was used specifically to establish goals for the School Improvement Plan and find suitable actions to address the more immediate issues facing the school.

Phase three: executing   To address the improvement areas identified in the assessing phase, quality teams were formed in Phase Three. These teams consisted of concerned stakeholders, such as teachers, administrators, staff, parents, and community members, who were willing to work on a team in addressing areas in need of improvement in the school.

There were several teams established in such areas as Policies, Multicultural-ism, Facilities, Student Achievement, School Improvement, Parent and Com-munity Relations, Safety, Human Resources and Organizational Development, and Technology. About six to ten members were on each team. Each team was responsible for addressing a specific issue as established in Phase Two. All teams were trained in team building and group problem-solving and decision-making strategies. Each quality team consisted of various stakeholders who genuinely desired to work on an issue, or who were associated with an is-sue by nature of their work responsibilities. For example, if the issue was to improve discipline, the school disciplinary dean was involved on this quality team. A listing of each team and issue was posted on a bulletin board where interested candidates could also sign up.

Some general guidelines for the quality teams included: voluntary member-ship, ground rules for conducting the meetings, and clearly stated team goals and outcomes. For example, the Achievement Team was given the task of addressing student academic deficiencies. Various actions were proposed and implemented, such as an extended-day school program, improved curriculum and instruction, and acquisition of additional resources (e.g., books, materials) for students with academic deficiencies. In addition to establishing quality teams, a pool of facilitators was selected. These facilitators were various stakehold-ers who were trained in group-processing techniques. The facilitators were to act as group leaders in facilitating the sessions and were not to be viewed as chairpersons of a committee. They kept the quality teams on task, developed the meeting agendas and minutes, and acted as a communication link with the Steering Committee and school (Harrington, 1987). The facilitators also posted their teams' minutes on the school bulletin board so that everyone could be kept informed on the teams' progress—a process called "scoreboarding." In most cases, facilitators were assigned to a team that was not closely associated with the members of the team or the issue. Thus, the facilitators could remain neutral and maintain a focus on facilitating the session, not get involved with the issue. The overall goal of the facilitator was to assist the teams in solving problems and making decisions by consensus.

RESULTS

Phase four: implementing   Upon approval by the Steering Committee, the action plans were implemented. The quality teams were not necessarily re-

sponsible for actually implementing the action plans. A quality team, in many cases, worked with the appropriate individual or department to implement the action plan. For example, the Policies Team developed a program for improving student attendance, but an administrator actually implemented it. The quality team stayed "on the sidelines," monitored the progress, acted as a liaison with the Steering Committee, assisted the administrator, and helped manage the process.

As result of the quality teams' efforts, significant actions were implemented. For example, the Policies Team developed and implemented several disciplinary policies, school rules and procedures, and parent and teacher handbooks. The Multicultural Team implemented many programs to celebrate the diverse cultures of the school. Safety programs were implemented, community members became more involved, school facilities improved, and conflict decreased. A follow-up survey also showed significant improvement in morale within the school.

Although it was too early to assess the long-term effects of the school changes on student achievement, initial test scores should increase. Scores on the Iowa Tests of Basic Skills indicated an overall improvement of 3.2% in Reading Comprehension, and 1% in Total Math—a nice change from the previous downward trend.

The school's principal, working with the Human Resources and Organizational Development team, made several improvements in fiscal operations, staff and office changes, staff development programs, and other organizational areas (Tomal, 1993).

Phase five: evaluating Upon implementation of the action plan, the quality teams worked with the appropriate teams in evaluating the results of the actions. Follow-up surveys, individual and group interviews, student academic assessments, and benchmarking comparisons were all a part of the process. The teams were rewarded for their efforts and achievements. Various extrinsic rewards systems, such as t-shirts, buttons, certificates, and luncheons were used. The teachers were also paid for their extended school day through State Chapter One funds. Most importantly, the achievements of the students were celebrated through school events. Recognizing the students and including parents and community through school events resulted in personal satisfaction and motivation for continued success.

As a result of the actions, selected quality teams continued their work on achieving continuous improvement. The continuous improvement process

entailed the constant pursuit of quality improvement in all aspects of the organization (Ciampra, 1992). The quality teams re-examined the teams' action plans and suggested ways for even better improvement.

The final step involved reassessing the entire CPI strategy and making necessary improvements to the process. The Steering Committee rotated members to include fresh viewpoints and allowed others to participate in the process at this level.

DISCUSSION

Although the CPI strategy offers a viable approach in achieving school improvement, a myriad of problems can occur. In this study, problems included lack of quality time for team meetings, negative attitudes by teachers and staff, lack of administrative support to teachers and staff, infiltration of political agendas by stakeholders, poor attendance by team members, and lack of financial support.

The inherent distrust between teachers and administrators needed to be overcome in order to establish the process. Many teachers were skeptical about the process and the principal's commitment to teachers and the process. Although team-building and conflict resolution sessions helped to reduce this problem, there continued to be some conflict and mistrust.

Variations of the CPI strategy can easily be adapted for an organization based upon its unique needs and characteristics. Although the process can be useful in developing the SIP for the ensuing year, it can also be valuable as an intervention process at any point in the school year. Schools that are in an educational crisis or are experiencing acute or chronic educational problems and do not know what to do can utilize the process as a catalyst to initiate viable change. For example, if a school is suddenly put on probation, the process could be utilized to reassess the school, develop a revised SIP, and implement the modified plan.

Every organization is a living organism unto itself and the CPI strategy, like any process, will need to be tailored for the individual school. Roadblocks will undoubtedly be encountered, and the educational leader and school consultant will need to be able to adjust the process. However, the use of the CPI strategy can offer a practical and viable approach in establishing and bringing about meaningful organizational change and long-term school improvement.

REFERENCES

Bracey, G. (1994). The fourth Bracey report on the condition of public education. *Phi Delta Kappan 76*, 114–127.

Camp, R. (1989). *Benchmarking: The search for industry best practices that lead to superior performance*. White Plains, NY: Quality Resources.

Ciampa, D. (1992). *Total quality: A user's guide for implementation*. New York: Addison-Wesley Publishing.

Cuban, L. (1994). How can a national strategy miss a third of our schools? *Education Digest 59*, 12–17.

Daresch, J. & Playko, M. (1995). *Supervision as a proactive process: Concepts and cases*. Prospect Heights, IL: Waveland Press.

French, W. & Bell, C. (1995). *Organization development: Behavioral science interventions for organization development*. Englewood Cliffs, NJ: Prentice Hall.

Greenberg, J. & Baron, R. (1995). *Behavior in organizations: Understanding and managing the human side of work*. Needham Heights, MA: Allyn & Bacon.

Harrington, H. J. (1987). *The improvement process: How America's leading companies improve quality*. New York: McGraw-Hill.

Kossen, S. (1994). *The human side of organizations*. New York: HarperCollins.

Lewis, J. (1986). *Achieving excellence in our schools . . . by taking lessons from America's best-run companies*. Westbury, NY: Wilkerson.

Sergiovanni, T. (1996). *Leadership for the schoolhouse: How is it different? Why is it important?*. San Francisco: Jossey-Bass.

Tanner, D. (1993). A nation truly at risk. *Phi Delta Kappan 75,* 288–297.

Tomal, D. (1993). Staff development, filling gaps in teacher preparation. *The School Administrator 50* (2), 51.

Tomal, D. (2007). *Challenging students to learn: How to use effective leadership and motivation tactics*. Lanham, MD: Rowman & Littlefield Education.

Tomal, D. (1998). Collaborative process intervention: An action research study. Critical issues in teacher education. *Journal of the Association of Teacher Educators 7*, 53–60.

Wagner, T., & Kegan, R. (2006). *Change leadership: A practical guide to transforming our schools*. San Fransicso: Jossey-Bass.

CHAPTER 7 EXERCISES AND DISCUSSION QUESTIONS FOR ACTION RESEARCH STUDY #1

1. What was the purpose of the study?
2. How was the data collected in the study?

3. Who were the subjects of the study?
4. What were some of the threats to validity or limitations?
5. What were the results of the study?
6. Describe the five-phase collaboration process intervention process used in this study.
7. Describe some ways to improve this study.
8. How would you conduct a follow-up to this study?

MODIFYING DISCUSSION AND ASSESSMENT TECHNIQUES TO INCREASE STUDENT UNDERSTANDING AND TEACHER REFLECTIVE PRACTICES

Brian Sica, chemistry and physics instructor

ABSTRACT

As a chemistry teacher I have had two major goals for my students. First, I wanted my students to gain an understanding of this central science and how it relates to their everyday lives. In addition, I wanted my students to be prepared for a college-level chemistry course that they would be taking within the next few years. While these two goals are inherently related in their nature, I found myself delivering a course full of disconnect. When preparing my students for their college years I would focus on the numerical applications of topics such as stoichiometry, equilibrium, and kinetics. When attempting to demonstrate practical applications I would rarely show connections to the equations. In order to increase the continuity between scientific principles and numerical problem solving, I modified both my delivery of material as well as the way students responded in typical assessment. Increasing teacher wait time to modify delivery allowed me to more carefully select who would respond in class, and allowed me to think about my comments, as well as provided more students with the opportunity to contemplate a response. By using Vee diagrams and modified test questions I was able to require students to explain their reasoning in a greater detail than typical questions would allow, as well as more accurately identify misconceptions of scientific principles.

CONTEXT

This action research was conducted at a High School in Idaho. The town is a small rural community in southeastern Idaho with a population of about 5,000. It has a median income of $44,677 while 18% of adults hold a bachelor's degree or higher. With a few notable exceptions, the economic focus of the region was agricultural. The High School was an average sized school by state standards with an enrollment of 630 students and a faculty of about 40 members (Standard and Poor's, 2005). The community was very involved with the activities of the school; however, athletics and extra-curricular activities seemed to affect daily life more than academics. Most of the seniors planned on attending a postsecondary institution, however, many will enroll in the nearby state university or local extension campuses and few travel out of the area.

Problem

A typical day in my class involved students solving a numerically based problem. The pedagogical intent of the question was to evaluate the students' understanding and application of the conceptual framework for the unit we were studying. In reality, that was not what was tested. Students typically provided answers, which they derived by simply plugging numbers into an equation or by memorizing a process that they had used in the past to answer similar questions.

In reflection on my teaching practices, I realized that while I have encouraged this rote memorization I would rather teach students higher-level thinking skills. What I found was that my class presented a dichotomy. I did not effectively show the link between the conceptual framework and the numerical examples that were seen in my class. I felt this was documented in the observations that I made. First, I allowed myself to take the easier approach when answering questions about numerical problems. The path of least resistance was to write the necessary question on the board, identify the variables, and solve for unknowns. I felt that this method did very little in explaining the scientific principles that were actually involved. I wanted to develop methods for connecting the concepts of the problem with the algorithmic methods used to solve that problem.

Research Questions

Focus Question: *What effect did changes in questioning and class discussions have on the overall continuity between the conceptual framework of chemistry and the algorithmic problem-solving techniques in my class?*

Sub Question #1: *Were Vee diagrams a viable and productive method for students to respond to questions?*

Sub Question #2: *Did increasing teacher wait time and modifying teacher prompts improve the use of a conceptual vocabulary during class discussions?*

Sub Question #3: *Did asking questions that require both concepts and algorithmic process increase the overall continuity in my class?*

CONCEPTUAL FRAMEWORK AND ACTION

The underlying issue to this research was my own living contradiction. I found myself not acting in accordance to my own educational value (McNiff, 2003). My own educational values were that I wanted my students to be exposed to the underlying concepts of chemistry which drive the physical world around them. An equally important goal was that students were also exposed to the mathematical treatment of those concepts at the levels similar to the rigors of a first-year college course. While my values told me that these were interconnected issues, my practice separated the two. I tended to be very descriptive in introducing concepts and very equation-based when dealing with the numerical questions.

In perpetuating this cycle, I felt that my students did not leave my class with a strong understanding of chemistry. As my students memorized steps, algorithmic processes, which allowed them to solve questions, misconceptions of the underlying principles were not overcome. Also, while the intent of a numerical question was to test the students' understanding and application of the concept, this rarely occurred. More often the question served as a test of variable identification and simple algebraic process. In "The Assessment of Students' and Teachers' Understanding of the Gas Laws" Lin and his colleagues from the National Kaohsiung University suggested that students were likely to conduct only mindless manipulations of mathematical equations when answering gas laws questions. They went on to claim that the reasoning for this was that students did not trust their own conceptual understanding of the material (Lin & Cheng, 2000). I felt that by increasing the continuity between the concepts and the problems, students would begin to trust their understanding enough to use it as a basis for completing the problems. In addition, this continuity served to reinforce to students that the steps designed to solve problems are all developed from a conceptual basis. As questions were further linked to concepts, the overall learning experience of the students could be improved. Dr. Novak of Cornell University suggested that there were but a

few dozen super ordinate concepts that govern the thousands of subordinate concepts that were taught in a typical science class. He also suggested that if these were to be truly learned and that learning made meaningful, students must be able to integrate these concepts (Cardellini, 2004).

As the teacher, I was responsible for delivering material that encouraged students to connect concepts to mathematical application. According to an article published in the *Journal of Chemical Education* titled "Encouraging Meaningful Quantitative Problem Solving," unless students were required to extract explanations and interpretations of the underlying phenomena in their own words, they memorized formulas or patterns for performing calculations (Cohen, 2000). This suggests that a class should not be centered on an equation or mathematical process. In contrast, the class itself should be aimed at explaining the physical processes described by equations. If students are able to explain process and equations then perhaps they will use them in a more meaningful manner.

To modify the method used to answer typical problems, I chose to implement the use of Vee diagrams in the class. Vee diagrams were developed to clarify the nature and purpose of lab work in science (Novak & Gowin, 1984). I used Vee diagrams to serve this same purpose for questioning, not for actual experiments. The nature of the Vee elicited reflective thinking by the students (Novak & Gowin, 1984). By looking into a problem in more detail, a student began to realize the underlying connections between science and mathematics. Vee diagrams have been used extensively by teachers trying to show more meaning in laboratory experiments. By using the same logic, a Vee diagram should elicit more meaning from a typical question (Gowin & Alvarez, 2005).

RESULTS

Sub Question #1: *Will Vee diagrams be a viable and productive method for students to respond to questions?*

Vee diagrams can be used as a tool for a teacher to assess a student's conceptual understanding of the question.

To qualify the use of Vee diagrams as productive, they must fill roles that traditional types of questions cannot. When using a typical question, if a student answers the question correctly, I tend to assume that he understands the material. Vee diagrams can show that this may not be the case. Below is a list of misconceptions from students who had provided the correct answer to the following questions as their Value Claims, as shown in Vee diagrams.

Focus Question: *Please determine the correct name for Fe(NO₃)⁻²*

Correct Response: *Iron (II) nitrate*

Misconceptions Identified:

- "If it is not on the periodic chart look it up on the polynomial chart to determine the name of the chemicals." (2S10)
- "There are two types of chemical compound, ionic or molecular." (1S5)
- "Cations and anions must be neutral." (3S12)

Focus Question: *Please write a balanced chemical equation for the complete combustion of ethane gas (C_2H_6)*

Correct Response: $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

Misconception Identified:

- "After a reaction takes place you always have carbon dioxide and water as a result." (1S7, 3S15)
- "You need the same number of atoms in each molecule on both sides of the equation." (1S8)

When assessing the implications of these students' responses, I determined that there were aspects in the conceptual framework that needed to be filled. The comments concerning both the types of chemical compounds and the results of a combustion reaction indicated to me that students were not thinking outside the realm of the current question. In the case of naming, this exam required students to differentiate between only ionic and molecular compounds, though we discussed metallic and organic briefly in class. Most students did not mention these types of compounds in their Vee diagrams. In the case of the combustion question, students had learned to associate the word combustion with both the use of oxygen gas as a reactant but also carbon dioxide and water as products. While this is true in the case of the complete combustion of a hydrocarbon, students again failed to list anomalies discussed in class such as the incomplete combustion of a hydrocarbon (slow burning paper) or the case of the rapid oxidation of a metal (burning magnesium). From these types of responses I determined that students were not always using the vocabulary accurately, and I readdressed these issues before moving on in class.

Students were more likely to demonstrate their conceptual understanding when using a Vee diagram. As stated previously, over 95% of my students felt that a Vee diagram can be used to demonstrate the conceptual understanding

of a topic was determined early on in this process. I was interested, however, to see how students would respond to this question if they were allowed to elaborate. The following comments were made when asking this question in an open interview setting:

- *"They show that you have a knowledge of what you are doing."* (3S7)
- *"The difficult part of the Vee diagram was organizing all the info that you know, our whole lives we have been allowed to just assume the person grading will know what we are talking about. Now I actually have to explain it."* (2S5)
- *"How you actually have to think about what you are doing."* (1S4)

Vee diagrams provided a method to require students to list or express the details of a question. My initial data in this study led me to conclude that students would not always be willing to demonstrate conceptual understanding when answering a typical question. After all, I was requiring them to do more than what is usually expected. In this case of the Vee diagrams, they were to not only provide a typical response to the question, but also show a clear path to how they got there. Many students did not see the value in this, as evidenced by their survey responses.

Sub Question #2: *Will increasing teacher wait time increase the use of a conceptual vocabulary during class discussions?*

Teacher is afforded a tool that allows for more evenly distributed student participation. Initial survey shows that an overwhelming majority of students feel that they were provided with an adequate opportunity to respond in class. However, as I noted numerous times in my journal, I felt that there were few students taking an active role in class discussions.

The class discussions are being dominated by too few students. In first hour it is due to a few outspoken kids, second hour is like pulling teeth to get anyone to talk, and many in third hour may lack the confidence to speak aloud.

Students remained more engaged in class when others have not yet responded. Initial comments from students indicated to me that there were a number of students in my class who simply chose not to openly participate. I am not the type of teacher who calls on students who I feel do not want to speak out in front of the class. Because of this, I wondered how this increase in wait time would affect such students. This curiosity was heightened, as I did not see an appreciable increase in number of students responding in class. However, in looking at the following data, I feel that more students were en-

gaged in the question, when they know that they will have a window of time in order to organize their thoughts in their minds.

Sub Question #3: *Will asking questions that require both the use of concepts and algorithmic processes increase the overall continuity in the class?*

These questions show misconceptions that typical tests cannot.

In the past, during a typical exam, if a student had completed a question correctly, I assumed that he had successfully learned the material. In developing these new types of questions, I attempted to make students use a typical process to solve the questions, yet expand their answers to show that they did in fact understand what they were doing. In several cases students were able to correctly answer a question, yet provided misconceptions in the explanation.

CONCLUSIONS

From the results displayed above I felt that I can make certain conclusions to my initial sub questions. These questions were initially presented to provide insight toward my focus question. While they have done this, in the true nature of action research, they have provided more avenues for which to look at my class. As suggested I will break these into conceptual and methodological claims. Because there was not a clear division between conceptual and methodological, I offer the definition that I have used below.

Conceptual Conclusion: Those conclusions that result from my evidence that directly answer the question of record.

Methodological Conclusions: Those conclusions that can be made as a result of implementing the changes defined in this study, yet do not directly answer the question of record.

Sub Question #1: *Will Vee diagrams be a viable and productive method for students to respond to questions?*

Conceptual: Vee diagrams have been shown to be both a viable and productive method for students to answer questions. In order to claim that these were viable, students needed to be able to use them to state the answer to a question as well as demonstrate to the instructor that they have used an accepted process (show their work). As seen in the examples of Vee diagrams, students were able to use the Value Claims section to post what they would consider their final answer. Also, in order to properly show their

work students were able to use the records section to list the givens in the problem; the transition section to apply any formulas, constants, or other algorithmic processes; and use the knowledge claims to organize their results. By doing this, students were using the Vee diagram to answer test questions.

Methodological: While the text of this question suggested that its results will lie only in the realm of the student, conclusions can in fact be drawn as to the viability and productivity of using Vee diagrams from a teacher perspective. By looking at the entire Vee diagram, I was able to make an educated assessment of the overall understanding of the material by a particular student. Previously, when grading a question, I was able to evaluate an answer and any work they had shown. While those components were also clearly shown in the transitions and claims of the Vee diagram, I was also able to evaluate their conceptual process via the left side of the Vee. In looking at the various conceptual sides, I was able to identify areas that needed reteaching. I was also provided with a focus on which to initiate that reteaching.

The Vee diagrams also have served as a sort of checks and balances system to my teaching. When preparing my own version of the Vee, I was forced to actually organize my own conceptual thoughts into a hierarchical manner. This allowed me to feel more prepared when delivering my lecture and more confident that the material I wanted the students to know was being presented.

Sub Question #2: *Will increasing teacher wait time increase the use of a conceptual vocabulary during class discussions?*

Conceptual: My teacher-focused claims in this area alone indicated that yes, an increase in the conceptual vocabulary in class has been achieved. I am now less likely to take over for a student; it was more likely that a student developed an answer to a question that was conceptually correct. As shown in the previous section, in the past I have taken any half truth that a student suggests, twisted their words into a conceptually useful statement, and solved the problem through an algorithmic process. Instead of this, the increase in wait time allowed me time to process what a student was saying and deliver prompts to further the discussion. I am now much more comfortable allowing a student to develop or amend his or her comments so that they are correct. Many times the student who initiates the conversation still does not have the last word. Now, however instead of me being the primary person to "tie everything together" I am comfortable to wait and allow others to build on what was originally said. This encouraged further student involvement

and an increase in the discussion of scientific principles and concepts. Now, with the increase of the conceptual vocabulary the algorithmic process was becoming more of a final step rather than the focus.

Methodological: In addition to the increase in the conceptual vocabulary other changes did occur. I was able to obtain a more even distribution of students responding in class. The wait time provided me with the opportunity to make a conscious decision on who to call on. By keeping an informal tally in my head, I was able to ensure that a few students did not dominate the conversation.

Students were also more engaged in class because of the wait time. There were still a number of students who chose not to respond in class; however, I feel that more of those students were continuing to think about the proposed question, when in the past they relied on an almost instant answer.

I have also determined the five-second rule to be one that I should implement in all of my classes, not just my chemistry classes. In addition to the courses addressed in this study, I used the five-second rule in both physics and freshman survey of science. I realized when lecturing to my freshman class that I was now uncomfortable with students immediately raising their hands. I smiled to myself and realized that a change had occurred. Where in the past I was most pleased if any student could quickly determine the answer that I was looking for, I saw that I now judge success by the number of students I felt were thinking about my question.

Sub Question #3: *Will asking questions that require both concepts and algorithmic processes increase the overall continuity in class?*

Conceptual: Yes. The implementation of this question had the greatest impact to the overall continuity of the class. There were a few reasons for which I made this conclusion. From an instructor's point of view, I was able to see where a student was misguided in his approach to finding a solution. In a fashion similar to the Vee, this provided me with an opportunity to focus my correction of misconceptions through reteaching. These questions were later shown to have been a way to evaluate if those misconceptions had been overcome. The results of these questions may have been enhanced by students' inherent value that they place on their grade. While the students did maintain a generally positive attitude toward the Vee's these new questions were never criticized as not being a natural part of the class. Due to the fact that these were integrated into typical tests, the students seemed more willing to improve on their responses to these, as they had a greater impact on their overall grade.

Methodological: The implementation of this question also provided me with another example of increasing both my preparedness and completeness in class. As I was preparing material for a particular unit, I had already developed a rough draft of the conceptual question for the test. From this I was able to identify the key concepts that I felt a student should know and plan my lessons accordingly.

In general, I developed these questions in order to more acutely focus my students' attention on the components of the question. By doing so each question was composed of multiple sections. In evaluating the students' responses, I was able to identify areas that were commonly missed by multiple students and reflected on my delivery of the material. Not only was I able to focus my reteaching of the material, I also used this as an opportunity to access my original teaching effectiveness.

Focus Question: *What effects will changes in questioning and class discussions have on the overall continuity between the conceptual framework of chemistry and the algorithmic problem-solving techniques in my class?*

Conceptual: The implementation of Vee diagrams, modified questions, and teacher wait time have all provided opportunity for connection between concept and process to occur on a regular basis during class. I am no longer comfortable accepting a response to a question as evidence of conceptual understanding. Continuity in my class was achieved in the areas of discussion, guided practice (Vee diagrams), and in assessment (modified questioning). These changes have allowed for all aspects of my class to include seamless transitions from the conceptual framework of chemistry to the algorithmic processes used to solve problems.

Methodological: There was additional continuity achieved as a result of this project. My course was much less segmented as it had been in the past. At many times, I have explained my problems as my class having conceptual days and mathematical days. These three changes in course administration have eliminated this problem. With exception of the laboratory component, all aspects of class are now connected.

DISCUSSION

I began this research by identifying what was bothering me about my class. I found an aspect of class that I felt needed improvement and the process began. Before any changes could be made, however, I had to look at some

of the causes to this problem in class. It seemed that there were many; students not wanting to do anything difficult, parents only worried about their child's GPA, not their learning process, possibly even a school administration placing too little emphasis on academics. While these may have and possibly still continue to hinder the progress in my class, they were superficial to the actual problem that I needed to address in my class. I was the problem or at least my actions were a problem. By identifying the connection between concepts and processes as an important goal of my class, I had inadvertently identified it as a core value of mine. Then by saying that this connection was not occurring in my class, I identified a disparity between my values and my reality. In order to truly develop as a teacher, however, I needed to take this a step further. What part of this disparity was my fault, what was I doing that did not allow my values to be my reality? I was able to admit that I was teaching to the path of least resistance. I was explaining processes through equations rather than concepts, because equations give finite answers. In fact the finite nature of equations does not lead well into constructive learning. Students were typically taught to just believe equations. If this was true, then by explaining science through equations, I was not giving students an opportunity to question their understanding. This was a safer route for a teacher to take. Equations are solid, directly copied from a tested textbook. To explain a process, however, teachers tend to describe it as they see it, in their own words. In this manner it opens a teacher to the possibility of making a mistake, or even more troubling, admitting that they do not know.

Why should this be so troubling, the idea of not knowing a scientific answer? The starting point of all science was something that we do not know. We did not know what the center of the universe was, we did not know how our cells decide their path of maturity, and we did not know what made up earth, air, fire, and water. There were still plenty of things that we do not know, so why was it a problem for me to admit that I do not know something? The answer lies in what governs the class.

I feel that my teaching has progressed through stages. I have gone so far as to identify stages that I have not yet seen, only hope to achieve. These stages are based upon 20 years of education as a student and seven years of teaching at both the college and high school levels. Each stage of my teaching has been governed by a central focus. That focus was very difficult to explain, but could be summarized as follows. Early on in my career, I was the center of my teaching; the success of my day was determined by how smoothly a class went from my perspective. Did I make mistakes, did the students behave, and did the principal notice an interesting demonstration? I was trying to prove

that I was a good teacher. I was governed by the idea that the teacher is the expert and must fill his students with knowledge. My goal was to display my knowledge, which was my living contradiction. This early living contradiction established a safety net, use an equation or set process to answer students' questions, especially if those questions were regarding concepts that I continued to struggle with.

That brings me back to this research project, where my first major hurdle was to identify myself as the cause for my core values to not be expressed in my teaching. What was the value in expressing me as a living contradiction?

This has proven to be one of the most valuable tools I could carry as a teacher. I can now allow myself to make mistakes. I am able to identify areas in my career that I need to improve upon. I can admit that I still have not progressed to the highest stage as a teacher, and it is not the fault of my students, or my administration. In identifying myself as the living contradiction I can develop methods to overcome whatever is bugging me as a teacher.

Those processes will all be a part of my action research cycle. I do not feel that teachers should complete various action research projects. They should do one, one that includes many reflections and modifications, but as a constant goal. That process will span the length of our careers and will never have an end. The goal should be to not live as a contradiction of values but to live as an expression of your values. At every stage in the action research cycle, new aspects of our contradictions are expressed, and we will develop methods to overcome them. Implementing these methods does indeed carry the hope for humanity, as Whitehead asks. Why, what value has learning the action research process had on me?

The reason action research is so useful, where other areas of education research have met so much opposition, is its immediate use in every classroom. I have been able to identify aspects of my class that should be changed, and those changes will be made by modifying my behavior. As soon as I make these admissions, the change can begin. These changes can be permanent; they are as scientists say repeatable. Replication of research is difficult in education, but action research does not hide or step around this, it embraces it. The sample of an action research project is the teacher! The changes I have documented for this year will still be there as long as I am willing to use them. I can support this by looking at what I have done this year. One aspect of my project was to implement the five-second rule. I found it very helpful in overcoming a major component of my living contradiction. I have implemented this rule in all of my classes, even though my official action research focused on only my first three periods of the day. The results that this rule has on me are the same, regardless of the class, the student's attitudes or

academics level. Action research has provided me with a tool to identify the stage of teaching I am at, and to develop into where I want to be.

REFERENCES

Ahlberg, M. (1993). Concept maps, Vee diagrams and Rhetorical Argumentation Analysis (RAA): Three education theory based tools to facilitate meaningful learning, in Novak, J. & Abrams, R (eds.) *Proceedings of the Third International Seminar on Misconceptions and Educational Strategies in Science and Mathematics*. Cornell University. Published electronically.

Beall H. and S. Prescott (February 1994). Concepts and calculations in chemistry teaching and learning. *Journal of Chemical Educations* 71 (2).

Cardellini, L. (September 2004). Conceiving concept maps to foster meaningful learning: An interview with Joseph D. Novak. *Journal of Chemical Education* 18 (9).

Cohen et al. (September 2000). Encouraging meaningful quantitative problem solving. *Journal of Chemical Education* 77 (9).

Gowin, B. D. and M. C. Alvarez (2005). *The art of educating with V diagrams*. New York: Cambridge University Press.

Lin, H.-S. and H.-J. Cheng, February 2000). The assessment of students' and teachers' understanding of gas laws. *Journals of Chemical Education* 77 (2).

Mills, G. E. (2003). *Action research: A guide for the teacher researcher*. Upper Saddle River, NJ: Pearson Education.

McNiff, J., P. Lomax, & J. Whitehead (2003). *You and your action research project, 2nd edition*. New York: RoutledgeFalmer.

Novak, J. D. and D. B. Gowin (1984) *Learning how to learn*. New York: Cambridge University Press.

Rowe, M. B. (1972). *Wait time and rewards as instructional variables, their influence in language, logic and fate control*. Paper presented at the National Association for Research in Science Teaching, Chicago, IL, ED 061 103.

Stahl, R. (1994). Using "think time" and "wait time effectively in the classroom. *ERIC Digest*. ERIC # ED370885.

Standard and Poors. High school, Idaho Public Schools—Overview. Retrieved June 13, 2006, from http://www.schoolmatters.com/app/locations/q/stid=13/llid=118/stllid=371/locid=1026759/catid=-1/secid=-1/compid=771/site=pes.

State of Idaho. Ammended 2005 AYP School Summary. Available online, June 13, 2006, from http:/www.sde.state.id.us/dept/.

Whitehead, J. Do action researchers' expeditions carry hope for the future of humanity? How do we know? *AR Expeditions*. www.areexpeditions.montana.edu Available April 24, 2005.

Zoller et al. (1999). Students' self-assessment in chemistry examinations requiring higher- and lower-order cognitive skills. *Journals of Chemical Education* 76 (1).

CHAPTER 7 EXERCISES AND DISCUSSION QUESTIONS FOR ACTION RESEARCH STUDY #2

1. Were the title and abstract clear and understandable?
2. What was the context of this study, and how well did the researcher describe the population and provide a background to the problem?
3. What was the problem statement? How did the use of reflection play a role in the researcher's identification of the problem?
4. How did the research questions support the researcher's problem statement and provide a basis for addressing the intended educational problem?
5. Briefly describe the researcher's conceptual framework. What purpose did the conceptual framework serve in this study?
6. Briefly describe the results of this study. Were they clear and concisely written?
7. Briefly describe how the researcher used characteristics of qualitative research in this study.
8. How well did the author draw conclusions for this study?
9. How well did the researcher cite sources to back up his comments?
10. Make any other observations to this study such as writing style, methodology, significance, limitations, etc.

A

ETHICAL STANDARDS OF THE AMERICAN EDUCATION RESEARCH ASSOCIATION

II. GUIDING STANDARDS: RESEARCH POPULATIONS, EDUCATIONAL INSTITUTIONS, AND THE PUBLIC

A. Preamble

Educational researchers conduct research within a broad array of settings and institutions, including schools, colleges, universities, hospitals, and prisons. It is of paramount importance that educational researchers respect the rights, privacy, dignity, and sensitivities of their research populations and also the integrity of the institutions within which the research occurs.

Educational researchers should be especially careful in working with children and the vulnerable populations. These standards are intended to reinforce and strengthen already existing standards enforced by institutional review boards and other professional associations.

B. Standards

1. Participants, or their guardians, in a research study have the right to be informed about the likely risks involved in the research and of potential consequences for participants, and to give their informed

consent before participating in research. Educational researchers should communicate the aims of the investigation as well as possible to informants and participants (and their guardians), and appropriate representatives of institutions, and keep them updated about any significant changes in the research program.

2. Honesty should characterize the relationship between researchers and participants and appropriate institutional representatives. Deception is discouraged; it should be used only when clearly necessary for scientific studies, and should then be minimized. After the study, the researcher should explain to the participants and institutional representatives the reasons for the deception.

3. Educational researchers should be sensitive to any locally established institutional policies or guidelines for conducting research.

4. Participants have the right to withdraw from the study at any time, unless otherwise constrained by their official capacities or roles.

5. Educational researchers should exercise caution to ensure that there is no exploitation for personal gain of research populations or of institutional settings of research. Educational researchers should not use their influence over subordinates, students, or others to compel them to participate in research.

6. Researchers have a responsibility to be mindful of cultural, religious, gender, and other significant differences within the research population in the planning, conduct, and reporting of their research.

7. Researchers should carefully consider and minimize the use of research techniques that might have negative social consequences, for example, experimental interventions that might deprive students of important parts of the standard curriculum.

8. Educational researchers should be sensitive to the integrity of ongoing institutional activities and alert appropriate institutional representatives of possible disturbances in such activities which may result from the conduct of the research.

9. Educational researchers should communicate their findings and the practical significance of their research in clear, straightforward, and appropriate language to relevant research populations, institutional representatives, and other stakeholders.

10. Informants and participants have a right to remain anonymous. This right should be respected when no clear understanding to the contrary has been reached. Researchers are responsible for taking appropriate precautions to protect the confidentiality of both participants and data. Those being studied should be made aware of the capacities of the various data-gathering technologies to be used in the investigation so that they can make an informed decision about their participation. It should also be made clear to informants and participants that despite every effort made to preserve it, anonymity may be compromised. Secondary researchers should respect and maintain the anonymity established by primary researchers.

Used with permission from the American Educational Research Association, 2002.

B

INFORMED CONSENT

CODE OF FEDERAL REGULATIONS TITLE 21

Sec 50.3 Definitions

As used in this part:

(c) *Clinical investigation* means any experiment that involves a test article and one or more human subjects and that either is subject to requirements for prior submission to the Food and Drug Administration under section 505(l), 507(d), or 520(g) of the act, or is not subject to requirements for prior submission to the Food and Drug Administration under these sections of the act, but the results of which are intended to be submitted later to, or held for inspection by, the Food and Drug Administration as part of an application for a research or marketing permit. The term does not include experiments that are subject to the provisions of part 58 of this chapter, regarding nonclinical laboratory studies.

(d) *Investigator* means an individual who actually conducts a clinical investigation, i.e., under whose immediate direction the test article is administered or dispensed to, or used involving, a subject, or, in the event of an investigation conducted by a team of individuals, is the responsible leader of that team.

(e) *Sponsor* means a person who initiates a clinical investigation, but who does not actually conduct the investigation, i.e., the test article is administered or dispensed to or used involving, a subject under the immediate direction of another individual. A person other than an individual (e.g., corporation or agency) that uses one or more of its own employees to conduct a clinical investigation it has initiated is considered to be a sponsor (not a sponsor-investigator), and the employees are considered to be investigators.

(f) *Sponsor-investigator* means an individual who both initiates and actually conducts, alone or with others, a clinical investigation, i.e., under whose immediate direction the test article is administered or dispensed to, or used involving, a subject. The term does not include any person other than an individual, e.g., corporation or agency.

(g) *Human subject* means an individual who is or becomes a participant in research, either as a recipient of the test article or as a control. A subject may be either a healthy human or a patient.

(h) *Institution* means any public or private entity or agency (including Federal, State, and other agencies). The word *facility* as used in section 520(g) of the act is deemed to be synonymous with the term *institution* for purposes of this part.

(i) *Institutional review board* (IRB) means any board, committee, or other group formally designated by an institution to review biomedical research involving humans as subjects, to approve the initiation of and conduct periodic review of such research. The term has the same meaning as the phrase institutional review committee as used in section 520(g) of the act.

(j) *Test article* means any drug (including a biological product for human use), medical device for human use, human food additive, color additive, electronic product, or any other article subject to regulation under the act or under sections 351 and 354–360F of the Public Health Service Act (42 U.S.C. 262 and 263b–263n).

(k) *Minimal risk* means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

(l) *Legally authorized representative* means an individual or judicial or other body authorized under applicable law to consent on behalf of

a prospective subject to the subject's participation in the procedure(s) involved in the research.

(m) *Family member* means any one of the following legally competent persons: Spouse; parents, children (including adopted children); brothers, sisters, and spouses of brothers and sisters; and any individual related by blood or affinity whose close association with the subject is the equivalent of a family relationship.

Source: U.S. Food and Drug Administration, April 1, 2008.

C

AMERICAN EDUCATIONAL RESEARCH ASSOCIATION DEFINITION OF SCIENTIFICALLY BASED RESEARCH

I. The term "principles of scientific research" means the use of rigorous, systematic, and objective methodologies to obtain reliable and valid knowledge. Specifically, such research requires:
   (A) development of a logical, evidence-based chain of reasoning;
   (B) methods appropriate to the questions posed;
   (C) observational or experimental designs and instruments that provide reliable and generalizable findings;
   (D) data and analysis adequate to support findings;
   (E) explication of procedures and results clearly and in detail, including specification of the population to which the findings can be generalized;
   (F) adherence to professional norms of peer review;
   (G) dissemination of findings to contribute to scientific knowledge; and
   (H) access to data for reanalysis, replication, and the opportunity to build on findings.
II. The examination of causal questions requires experimental designs using random assignment or quasi-experimental or other designs that substantially reduce plausible competing explanations for the obtained results. These include, but are not limited to, longitudinal designs, case control methods, statistical matching, or time series

analyses. This standard applies especially to studies evaluating the impact of policies and programs on education outcomes.

III. The term "scientifically based research" includes basic research, applied research, and evaluation research in which the rationale, design, and interpretation are developed in accordance with the scientific principles laid out above. The term applies to all mechanisms of federal research support, whether field-initiated or directed.

Source: Alternate Definition of Scientifically Based Research (SBR) Supported by AERA Council, July 11, 2008. Used with permission from the American Educational Research Association, 2009.

Ⓓ

CODE OF PROFESSIONAL RESPONSIBILITIES IN EDUCATIONAL MEASUREMENT

NATIONAL COUNCIL ON MEASUREMENT IN EDUCATION (NCME)

General Responsibilities

The professional responsibilities promulgated in this Code in eight major areas of assessment activity are based on expectations that NCME members involved in educational assessment will:

1) protect the health and safety of all examinees;
2) be knowledgeable about, and behave in compliance with, state and federal laws relevant to the conduct of professional activities;
3) maintain and improve their professional competence in educational assessment;
4) provide assessment services only in areas of their competence and experience, affording full disclosure of their professional qualifications;
5) promote the understanding of sound assessment practices in education;

6) adhere to the highest standards of conduct and promote professionally responsible conduct within educational institutions and agencies that provide educational services; and

7) perform all professional responsibilities with honesty, integrity, due care, and fairness.

Responsible professional practice includes being informed about and acting in accordance with the Code of *Fair Testing Practices in Education* (joint Committee on Testing Practices, 1988), the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, NCME, 1985), or subsequent revisions as well as all applicable state and federal laws that may govern the development, administration, and use of assessment.

Used with permission from the National Council on Measurement in Education, 2009.

E

SAMPLE CONSENT FORM

Dear Participant,

I am an associate professor at XYZ University, and I am conducting research in the area of student leadership and motivation. As part of this research, I would like to participate in a study and discuss with you factors that you feel motivate students. My intention is to attempt to publish the results of this information in a journal or book. Your statements will be kept confidential and will not be known to anyone except the researchers. There are no known risks other than what you might feel in providing the responses. I would like your consent for you to participate in this study with the following conditions:

1. I understand that participation in this study is voluntary.
2. I can withdraw from the study at any time with no negative consequences.
3. I have been informed in advance that there may be a survey or focus group.
4. I understand that the process will be anonymous—no names will be used.
5. I understand that the data will be potentially disseminated for university teaching purposes or research publication.

6. I understand that other research assistants may work with the lead researcher.
7. I may have a copy of this consent form, if desired.

Your signature below gives the researcher(s) permission and signifies that you consent to these conditions and terms outlined in this consent form.

Signature of participant _____

Printed name of participant _____

Date _____

Sincerely,

(Your Name)
(Your Title)
XYZ University

F

ONE HUNDRED IDEAS FOR CONDUCTING ACTION RESEARCH

1. Improving students' reading through parent interaction
2. Improving gender appreciation through coeducational classrooms
3. Creating prolific readers through the use of literature circles
4. Implementing strategies for discipline improvement
5. Improving female mathematical ability through heterogeneous educational programs
6. Improving children's reading through letter recognition
7. Integrating technology in the classroom for learning enhancement
8. Involving parents to improve student learning
9. Investigating year-round school to improve academic achievement
10. Implementing a mentor program to improve teacher effectiveness
11. Increasing student engagement through conversational styles
12. Using accommodations for learning disabled students
13. Improving reading fluency through use of the Great Leaps Reading Program
14. Developing a looping program to improve achievement
15. Improving reading comprehension through intrinsic motivators

16. Using peer mediation to reduce student conflict
17. Using a structured learning program for attention deficit students
18. Improving academic achievement through student-led conferences
19. Improving student learning through peer tutoring techniques
20. Using a multiage classroom environment to improve student social behaviors
21. Enhancing understanding of algebra through prompt writing and computational problems
22. Improving discipline through student involvement in extracurricular activities
23. Improving student attitudes toward reading through self-selection reading material techniques
24. Improving student self-esteem through a student advisory program
25. Improving student study skills and habits through television viewing preferences
26. Improving basic mathematic skills through remedial programming techniques
27. Improving the teacher evaluation system through benchmarking
28. Improving student homework through parental involvement for gifted students
29. Reducing teacher burnout through mentor intervention
30. Using hypnosis to improve student study skills
31. Using character education to improve discipline
32. Improving attendance through extrinsic motivators
33. Enhancing reading through the use of family reading programs
34. Improving science achievement through hands-on teaching methods
35. Using portfolio assessment to improve student learning
36. Improving mathematic achievement through journal writing
37. Improving student learning through ability grouping
38. Using brain-based learning for teaching effectiveness
39. Improving reading attitudes through the use of literature circles
40. Improving academic achievement through the use of graphic organizers

41. Increasing music ability through improved reading and language skills
42. Using block scheduling to improve scheduling efficiency
43. Using a summer bridge program to improve benchmark grades
44. Using flexible access library media programs to improve student achievement
45. Improving high school dropout rate through mentoring
46. Using multiple intelligences to enhance learning
47. Using an English immersion program for bilingual education improvement
48. Using phonic intervention for ESL student improvement
49. Improving math comprehension through use of journal writing
50. Using keyword mnemonic memorization for learning disabled students
51. Improving technical performance with mental visualization
52. Using sign language instruction to improve early childhood reading readiness skills
53. Improving reading proficiency through self-advocacy motivational tools
54. Improving problem solving and chemistry knowledge through use of didactic teaching techniques
55. Improving student literacy through an after-school newspaper club program
56. Improving discipline through the use of a uniform discipline code program
57. Improving education of learning disabled students through the use of personality style techniques
58. Improving at-risk emergent reading achievement through an early tutoring program
59. Improving reading achievement through an integrated reading program
60. Improving learning through gifted clustering techniques
61. Using direct instructional techniques on reading comprehension
62. Enhancing student responsibility with student-led conferences
63. Improving social studies achievement through cooperative learning

64. Using visual instruction for reading comprehension
65. Improving an intervention program through the use of an instructional interest program
66. Repeating oral reading prompts to improve student oral reading fluency
67. Improving second grade student learning through word-attack strategies
68. Using bibliotherapy to grow socially and personally
69. Improving students' spatial-temporal reasoning through piano sonatas
70. Using aerobic exercise to improve children's classroom behavior
71. Improving reading through an accelerated reading program
72. Improving cognitive ability through a think-tank enrichment model
73. Using a dress code to reduce gang presence
74. Using a level system for behavior disorder students
75. Improving athletic performance through cognitive restructuring
76. Improving student discipline through an in-school suspension program
77. Improving general education developmental programs through an alternative high school setting
78. Improving the performance of student athletes through a rigorous learning environment program
79. Improving students' perception of school culture through a standards-based advisory program
80. Improving reading fluency through use of a research-based intervention reading program
81. Improving reading achievement through a combination of whole language and phonics instruction
82. Improving the academic performance of Hispanic students through use of an after school intervention program
83. Improving reading performance of students through use of a phenomenological awareness instruction program
84. Helping students in career education through a career assessment program
85. Improving student learning through a parental decision making program

86. Helping students improve their math skills through use of a combination of graphing calculators and a collaborative intervention program
87. Helping students with learning disabilities improve their writing skills through use of a written expression program
88. Improving student behavior through a quantum learning program
89. Improving student behavior through use of a new school uniform policy
90. Improving students' mathematic achievement through use of a hybrid technology program
91. Improving students' reading scores through differentiated instruction
92. Improving students' learning through use of an integrating literature program
93. Improving student performance through use of yoga and yogic breathing techniques
94. Improving students' fluency scores through use of a reader's theatre program
95. Improving student academic gains in consumer education using an online learning program
96. Improving student homework completion through use of a research-based intervention program
97. Improving students' reading achievement through use of literature circles
98. Improving student behavior through an anti-bullying program
99. Improving student mathematic comprehension using a free-response assessment program
100. Improving student behavior and academic performance using a positive behavioral intervention program in an alternative school setting.

BIBLIOGRAPHY

American Educational Research Association. (2002). *Ethical standards of American Educational Research Association*. Washington, DC: APA.

American Psychological Association. (1992). *Ethical principles of psychologists and code of conduct*. Washington, DC: APA.

Argyris, C. (1970). *Intervention theory and method: A behavioral science view*. Reading, MA: Addison-Wesley.

Arhar, J., Holly, J., & Kasten, W. (2001). *Action research for teachers: Traveling the yellow brick road*. Upper Saddle River, NJ: Merrill.

Beckhard, R. (1969). *Organizational development: Strategies and models*. Reading, MA: Addison-Wesley.

Bernard, H. (1994). *Research methods in cultural anthropology*. Beverly Hills, CA: Sage.

Camp, R. (1989). *Benchmarking: The search for industry best practices that lead to superior performance*. White Plains, NY: Quality Resources.

Cohen, R., & Swerdlik, M. (2001). *Psychological testing and assessment: An introduction to test and measurement*. New York: McGraw-Hill Higher Education.

Cooperrider, D., & Whitney, D. (2005). *Appreciative inquiry: A positive revolution in change*. San Francisco, CA: Berrett-Koehler.

Dewey, J. (1933). *How we think*. New York: Health.

Farr, R., & Tone, B. (1994). *Portfolio and performance assessment: Helping students evaluate their progress as readers and writers*. Fort Worth, TX: Harcourt Brace.

French, W., & Bell, C. (1995). *Organization development: Behavioral science interventions for organization development*. Englewood Cliffs, NJ: Prentice-Hall.

Frick, T., & Semmel, M. (1978). Observer agreement and reliabilities of classroom observation measures. *Review of Educational Research 48*, 157–184.

Gall, M., Borg, W., & Gall, J. (1996). *Educational research: An introduction*. White Plains, NY: Longman.

Gay, L. R. (1996). *Educational research: Competencies for analysis and application*. Upper Saddle River, NJ: Merrill.

Grundy, S. (1994). Action research at the school level: Possibilities and problems. *Educational Action Research 2*(1), 23–36.

Gunz, J. (1996). Jacob L. Moreno and the origins of action research. *Educational Action Research 4*(1), 145–148.

Hammersley, J. (1993). On the teacher as researcher. *Educational Action Research 1*(3), 425–441.

Harrington, H. J. (1987). *The improvement process: How America's leading companies improve quality*. New York: McGraw-Hill.

Hoffke, S. E., & Stevenson, R. B. (Eds.). (1995). *Educational action research: Becoming practically critical*. New York: Teacher College Press.

Irbforum.org. (2009). Instructional Review Board.

Joyce, B., Weil, M., & Calhoun, E. (2009). *Models of teaching*. New York: Pearson.

Jung, C. (1923). *Psychological types*. New York: Harmony Books.

Keemis, S., & McTaggert, R. (Eds.). (1998). *The action research planner* (3rd ed.). Geelong, Victoria, Australia: Deakin University Press.

Kennedy, Mary M. (1997). The connection between research and practice. *Educational Researcher 26*(7), 4–12.

Leedy, P., & Ormrod, J. (2001). *Practical research: Planning and design*. Upper Saddle River, NJ: Merrill.

Lewin, Kurt. (1947). Frontiers in group dynamics. *Human Relations 1*(2), 143–153.

Lippitt, R., Watson, J., & Westley, B. (1958). Dynamics of planned change. New York: Harcourt and Brace.

Maslow, A. (1943). A theory of motivation. *Psychological Review 50*, 370–396.

Mayo, E. (1939). *The human problems of an industrial civilization*. New York: MacMillan.

McMillan, James H. (1996). *Educational research: Fundamentals for the consumer* (2nd ed.). New York: Harper Collins.

Mills, G. (2000). *Action research: A guide for the teacher researcher*. Upper Saddle River, NJ: Prentice-Hall.

Piaget, J. (1926). *The language and thought of the child*. New York: Harcourt, Brace & World.

Sagor, R. (1992). *How to conduct collaborative action research*. Alexandria, VA: Association for Supervision and Curriculum Development.

Shepard, H. (1960). *An action research model in action research program for organizational improvement*. Ann Arbor, MI: University of Michigan.

Spradley, J. (1980). *Participant observation*. New York: Hold, Rinehart & Winston.

Tomal, D. (1996). Action research: A practical and viable method for educators. *Lutheran Education 132*(2), 88–94.

Tomal, D. (1998). Collaborative process intervention: An action research study. Critical issues in teacher education. *Journal of the Association of Teacher Educators 7*, 53–60.

Tomal, D. (1998). Benchmarking: A viable process for discovering the best educational practices. *Eastern Educational Journal 27*(1), 36–38.

Tomal, D. (1999). *Discipline by negotiation: Methods for managing student behavior*. Lancaster, PA: Technomic.

Tomal, D. (2007). *Challenging students to learn: How to use effective leadership and motivation tactics*. Lanham, MD: Rowman & Littlefield Education.

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